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DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D.C. 20523

PROJECT PAPER

Proposal and Recommendations
For the Review of the
Development Loan Committee

GUATEMALA - Small Farmer Development

AID-DLC/P-2137

DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

UNCLASSIFIED

AID-DLC/P-2137

December 18, 1975

MEMORANDUM FOR THE DEVELOPMENT LOAN COMMITTEE

SUBJECT: Guatemala - Small Farmer Development

Attached for your review are the recommendations for authorization of a loan in an amount not to exceed Thirteen Million United States dollars ($13,000,000) to the Government of Guatemala ("Borrower") to assist in financing United States dollar and Central American Common Market local currency costs to carry out a program for small farmer development - including increasing the productive capacity of land resources, opening new lands for settlement, constructing access roads and strengthening public agricultural sector organizations ("Project").

This loan proposal is scheduled for consideration by the Development Loan Staff Committee on Monday, December 29, 1975, at 10:00 a.m. The telephone poll will be conducted after the meeting. If you are a voting member a poll sheet has been enclosed for your response.

Development Loan Committee
Office of Development Program
Review

Attachments:

Summary and Recommendations
Project Analysis
Annexes A - D
(Annex E will be distributed separately)

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PROJECT PAPER

Small Farmer Development

- Table of Contents -

PART I: SUMMARY AND RECOMMENDATIONS

A. Face Sheet 1
B. Recommendations 2
C. Description of the Project 2
D. Project Activities 3
E. Summary Findings 5
F. Project Issues 5

PART II: PROJECT BACKGROUND AND DETAILED DESCRIPTION

A. Background and Current Sector Activities . . 8
1. Opening of the South Coast 8
2. Problems of the 1970's 8
3. Tripartite Sector Assessment 10
4. International Donor Agency Response . . 11
5. Project Strategy 12
B. New Lands Settlement 13
1. Introduction 13
2. Strategy 15
3. The Program 16
C. Labor Intensive Roads Construction 28
1. Introduction 28
2. Project Description 32
D. Land Resources Improvement 41
1. Introduction 41
2. Project Description 42
E. Human Resources Development 49
1. Introduction 49
2. Project Description 52
F. Technical Assistance 62

PART III: PROJECT ANALYSIS

A. Technical Analysis 63
1. Demand Analysis 64
2. GOG Policies and Practices 69
3. Environmental Assessment 70

PART III: PROJECT ANALYSIS (Continued)

B. Social Soundness Analysis 74
1. Socio-cultural Feasibility 74
2. Project Beneficiaries 80
3. Benefit Incidence 84
4. The Role of Women 86

C. Economic Analysis 89
1. The Agricultural Sector 89
2. New Lands Settlement 90
3. Rural Roads 93
4. Irrigation and Conservation 100

D. Financial Analysis 103
1. Financial Summary 103
2. Counterpart Availability 103
3. Financial Plan 106

PART IV: IMPLEMENTATION PLANNING

A. Administrative Arrangements 112
1. Government of Guatemala 112
2. AID Mission 114

B. Evaluation Plan 116

C. Implementation Plan 124

D. Conditions Precedent and Covenants 131

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT PAPER FACESHEET

TO BE COMPLETED BY ORIGINATING OFFICE

1. TRANSACTION CODE ("X" appropriate box)
[X] Original [ ] Change [ ] Add [ ] Delete

PP

DOCUMENT CODE 3

2. COUNTRY/ENTITY
Guatemala/USAID

3. DOCUMENT REVISION NUMBER

4. PROJECT NUMBER
520-11-190-233
520-L-026

5. BUREAU
a. Symbol: LA
b. Code: 3

6. ESTIMATED FY OF PROJECT COMPLETION
FY 81

7. PROJECT TITLE - SHORT (stay within brackets)
[Small Farmer Improvement]

8. ESTIMATED FY OF AUTHORIZATION/OBLIGATION
a. INITIAL mo. 1 yr. 76 b. FINAL FY 78

9. ESTIMATED TOTAL COST ($000 or equivalent, $1 = Q 1)

a. FUNDING SOURCE	FIRST YEAR FY 76 b. FX	c. L/C	d. Total	ALL YEARS e. FX	f. L/C	g. Total
AID APPROPRIATED TOTAL	743.0		743.0	14,875.0		14,875.0
(Grant)	(470.2)	( )	(470.2)	(1,875.0)	( )	(1,875.0)
(Loan)	(272.8)	( )	(272.8)	(13,000.0)	( )	(13,000.0)
Other U.S. 1.					2,500.	2,500.
Other U.S. 2.						
HOST GOVERNMENT		222.6	222.6		10,649.	10,649.
OTHER DONOR(S)						
TOTALS	743.0	222.6	965.6	14,875.0	13,149.	28,024.

10. ESTIMATED COSTS (AID APPROPRIATED FUNDS)

a. Appropriation (AID Code)	b. Primary Purpose Code	c. Primary Tech. Code	FY 76 d. Grant	e. Loan	FY 77 f. Grant	g. Loan	FY 78 h. Grant	i. Loan	ALL YEARS j. Grant	k. Loan
IN			575.0		800.0		500.0		1,875.0	
IN				13000.0						13000.0
TOTALS			575.0	13000.0	800.0		500.0		1,875.0	13000.0
11. ESTIMATED EXPENDITURES			470.2	272.8	695.0	2533.5	530.0	3118.8		

12. PROJECT PURPOSE(S) (stay within brackets) [ ] Check if different from PID/FRP

[Increase agricultural productivity and create alternative employment opportunities in rural areas by increasing the productive capacity of small farmer land resources; opening new lands for settlement by small farmers and landless poor; expanding the farm-to-market transportation infrastructure; and strengthening the capacity of public agricultural sector organizations.]

13. WERE CHANGES MADE IN BLOCKS 12, 13, 14, or 15 OF THE PID FACESHEET? IF YES, ATTACH CHANGED PID FACESHEET.
[ ] Yes [X] No

14. ORIGINATING OFFICE CLEARANCE

Signature: Edward W. Coy

Title: Director, USAID/Guatemala

Date Signed: mo. 12 day 06 yr. 75

15. Date Received in AID/W, or For AID/W Documents, Date of Distribution: mo. 12 day 06 yr. 75

AID 1:[illegible]-4 (7-[illegible])

BEST AVAILABLE COPY

B. Recommendations

The following actions are being submitted for approval within this Project Paper:

Grant	$ 1,875,000
Loan	13,000,000
(Terms: 40 years, 10 year grace period. 2% during grace--3% thereafter)	
Total	$14,875,000

C. Description of the Project

1. Borrower/Grantee

The Borrower/Grantee will be the Government of Guatemala. Overall responsibility for implementing the program and administering the loan and grant assistance will be assigned to the Ministry of Agriculture. The Ministry of Communications and Public Works will play a major supporting role in the infrastructure/employment generation element of the proposed program.

2. Project Summary

The sector goal which this project addresses is to improve the quality of life and increase the incomes of rural Guatemalans.

Specifically the project is designed to increase agricultural productivity and create alternative employment opportunities in rural areas by:

a. Increasing the productive capacity of small farmer land resources;

b. Opening new lands for settlement by small farmers and landless poor;

c. Expanding the farm-to-market transportation infrastructure; and,

d. Strengthening the capacity of public agricultural sector organizations to carry out planning, programming and delivery of improved services and technical assistance to small farmers.

In its 1975-79 Agricultural Development Plan, the GOG identified inter alia the following sector constraints which are addressed by this project:

- Lack of effective programs addressing the highly unfavorable land-man ratio in the most densely populated rural areas of the country. Farm size is shrinking, more and more farm units are becoming sub-viable and the process is being aggravated by deterioration of land quality due to poor cultural practices.

- Poor rural transportation infrastructure greatly limiting the flow of agricultural inputs and farmer access to markets. Especially during the rainy season many areas are isolated.

- Lack of alternative employment opportunities to absorb rural under-employed and unemployed people. The major exception is contract labor work on large coastal farms under difficult conditions.

- A deficit in human resources necessary to plan and execute public agricultural sector programs.

D. Project Activities

1. New Lands Settlement

Settlement will be accelerated in the zone between the densely populated highland areas and the Mexican border (The Transversal Strip). While relying on the legal authorities presently delegated to the GOG's land transformation agency (INTA) for land acquisition and transfer, the activity will utilize existing cooperative federations and groups to select, orient and provide essential services for settlers moving to the new lands area. Loan funds will be used to finance production credit, basic cooperative infrastructure, and penetration roads necessary for settlement of 5,000 families during the life of the project. Loan funds will also finance cadaster and natural resources studies which will provide the basis for orderly settlement of additional areas in the northern transversal strip after the loan disbursement period.

2. Labor Intensive Roads Construction

Construction will be undertaken by the Dirección General de Caminos (National Road Service) to address the dual problems of isolation and unemployment in the Western Highlands, and Eastern and Northern Lowlands regions. The GOG has requested a loan from the IDB to finance a 300-kilometer expansion of rural secondary road infrastructure in these areas and AID will finance 280 kilometers of connecting farm-to-market and penetration roads to provide farmers with improved access to markets and agricultural supplies and services. The labor intensive road construction and the market access which they provide, will have a positive impact on incomes of the rural poor. Moreover, this activity will demonstrate to the GOG the feasibility and desirability of using labor intensive techniques.

3. Land Resources Improvement

As a means of improving small farmer productivity the Ministry of Agriculture will undertake a pilot small scale irrigation and soil conservation program in the highlands. Project funds will finance the construction of small scale irrigation projects on 5,000 hectares and contour furrows and ditches on an additional 5,000 hectares utilizing labor intensive construction methods. These land and water resources improvements will enable small farmers to increase their production of higher value crops which in turn will create more employment opportunities in rural areas. Experience gained through these pilot projects plus grant-financed technical assistance are expected to develop the institutional structure and technical capacity within the GOG to mount a future national program of small scale irrigation and watershed management.

4. Human Resources Development

The sector coordination and planning unit within the Ministry of Agriculture will be strengthened to increase the efficiency of public agricultural sector institutions. The unit will concentrate on setting planning objectives, reviewing budgets and programs and feeding the results of a program information and evaluation system to the operations of the sector agencies. Within the sector planning unit a manpower development and training office will be established to coordinate sector agency training programs including:

a. In-service training for field technicians who are the primary conduits of technical assistance to the farmers; and,

b. Scholarship training for selected technical and managerial personnel who are responsible for designing sector policies and technical assistance endeavors.

A detailed description of the above loan activities and complementary grant financed project activities is provided in Part II of this Paper.

E. Summary Findings

The Project Committee has reviewed the technical, economic and financial aspects of the proposed program. On the basis of this review and the investigations of specialized consultants during project design, the Committee recommends that a loan be authorized to the Government of Guatemala in an amount not to exceed $13 million. To assist the GOG in implementing the innovative aspects of this loan and improving other vital activities within the agricultural sector, it is also recommended that a companion grant of not more than $1,875,000 be approved to finance the technical assistance described herein.

These recommendations are based on the Committee's findings that the Project will make a substantial contribution to rural development by initiating activities which will relieve some of the major constraints to improving the well-being of the small farmers and landless poor in Guatemala. The loan project activities represent an ambitious undertaking, but with adequate technical assistance provided by the companion grant, they are judged to be feasible. Implementation of the various project activities will be initiated as indicated in the plans included in Parts II and IV.

The project meets all applicable statutory criteria (see Annex C) and the USAID Mission Director's 611(e) certification is included as Annex G.

F. Project Issues

The following issues have been raised with respect to the proposed program. Comments are provided as to their expected impact on project implementation and the realization of program objectives:

1. BANDESA Interest Rates

In 1974, the GOG announced a series of policy measures designed to stimulate increased production of basic grains. One of these reduced BANDESA's (the GOG's agriculture bank) interest rate on production credit loans to 5%. This action was considered to be only a temporary measure in that the country was facing a record short-fall in production. Nevertheless, the subsidized rate was continued into the 1975 crop year thereby raising the possibility that the cooperative movement and BANDESA's financial standing would be adversely affected. During the course of preparing the IRR for this project, the Mission raised the question of the 5% rate with BANDESA and the Planning Council in view of the large credit element which was being considered at that time. There was a concensus on the part of the officials involved that the rate would be raised but that timing would have to depend upon progress in overcoming the deficit in basic grains production. Subsequently, as a result of USAID-IDB coordination meetings, the IDB expressed interest in financing the credit element of the loan, with the result that production credit financing was removed from the proposed loan except for a relatively small amount allocated for credit for new settlers under the colonization sub-project. The interest rate issue was discussed in detail with local IDB personnel as well as with the Bank's project appraisal mission which visited Guatemala in September, 1975.

In a related development, the USAID Mission was informed by a World Bank representative that the Bank would be considering a loan for cooperative credit, possibly in 1977, with an interest rate of about 8% to the GOG which implies a high sub-lending rate by cooperatives. This further points up the need for a change in BANDESA's rate. The Mission believes that the projected $12 million IDB loan for cooperatives, plus another (possibly $12 million also) for general agriculture credit which will be considered by the IDB in 1976, should be sufficient leverage for obtaining a change in BANDESA's interest rate policy. In recent discussions with the Minister of Finance, the Mission raised the overall question again, and received assurances that the policy would be reviewed in the near future. The Mission has requested (Guatemala 5793) that AID/W develop with the IDB and IBRD a common policy for cooperative lending which would take into account their financial needs and an appropriate GOG credit policy for small farmers.

Because of the minimal production credit element of this loan and the geographic isolation of the settlement areas in which it will be extended, the Mission believes the GOG's subsidized interest rate policy will have limited impact on this project.

2. GOG Program Commitments

The following are major GOG commitments which have evolved during USAID-GOG project negotiations:

a. The Ministry of Agriculture and the National Planning Council have confirmed that INTA's land settlement role will be limited to transfer of land title to farmer ccoperatives or other groups who will carry out colonization activities as proposed in this Paper.

b. The GOG will appoint a Project Coordinator and organize special technical assistance teams to implement the irrigation and soil conservation activities. The Minister of Public Works has agreed to establish a special implementation unit for labor intensive road construction.

c. The GOG is exploring with the UN the establishment of a pilot program during 1976 to gain experience in labor intensive road construction.

d. The Ministry of Agriculture and the National Economic Planning Council have agreed on their respective roles in agriculture sector planning. The Ministry has agreed to expand its Sector Planning Unit as early as possible to help coordinate project activities.

e. The Minister of Finance has agreed to allocate $6.0 million in new budgetary resources to the program after review of all aspects of the project.

Based on the above commitments and the general agreement on all project elements, many of which represent new approaches for the GOG, during detailed negotiating sessions, the Mission is confident that project development can proceed in an orderly and successful manner.

3. Life of Project

Based on the nature of the proposed project activities, approval is requested herein for a five-year life of project for the loan element. A three-year obligation span is requested for the companion grant based on the intensive review.

II. PROJECT BACKGROUND AND DETAILED DESCRIPTION

A. Background and Current Sector Activities

1. Opening the South Coast--1950's and 60's

The opening up of the Pacific coastal lowlands in the 50's and 60's, provided a major impetus to diversification of Guatemala's commercial agricultural sector. Large areas of the coast went into the production of cotton, sugar, and beef, which have become major sources of foreign exchange earnings, challenging the former leading export crops--coffee and bananas.

AID and predecessor agencies supported this effort with a $9.5 million grant to finance the construction of 274 kms. of highway on the South Coast. Grant assistance was also provided for a GOG colonization program which settled over 20,000 families in the same area between 1955 and the mid-60's.

Clearly, the major positive changes in the sector between 1950 and 1968 occurred primarily in the large commercial sub-sector. The traditional agricultural sector (small farmers growing corn and some beans) was barely touched by modern agricultural technology and inputs. In fact, the relative position of the traditional highland Indian farmer deteriorated.

2. Searching for Solutions to Problems of the Small Farmer--the 1970's

In the late 1960's the Government decided to mount a major effort to increase production in the traditional sector. The $23 million AID Rural Development Loan authorized in 1970 was designed to support this GOG initiative which included a major reorganization of the agricultural public sector. Funds were allocated for expansion of the number of extension agents assigned to work directly with small and medium farmers; training for key personnel in the new agriculture research agency, training programs for farmers; a greatly expanded agricultural production credit program for basic grains and diversified crops; grain storage facilities and development of a handicraft production program.

Program accomplishments by mid-1975 were:

- Creation of autonomous agencies for research and technology, agricultural credit, marketing and basic grains price stabilization.

- An increase in the number of technical assistance agents assigned to work directly with farmers from 94 to 450.

- 28,800 farmers received training through mobile schools (16,900) and at agricultural training centers (11,900).

- The number of farmers receiving agricultural credit for basic grains and diversified crops increased from 2,067 in 1971 to 13,987 in 1974 while the amount of money loaned increased from $4.3 million to $26.4 million during the same period. Through July, 1975, approximately 25,000 agricultural credit loans have been made totalling $43 million.

- 43 agricultural public sector employees have received advanced academic training in the U.S. and third-country locations.

- Through August of 1975, 17 loans totaling $697,000 have been approved for construction of 12,590 MT of grain storage.

In addition to the agricultural public sector activities described above, AID (through loan and grant funds) has sponsored a vigorous program to foster the growth of the cooperative movement. The Federation of Credit and Savings Cooperatives (FENACOAC) grew, with AID assistance, from a loose grouping of 75 weak cooperatives with 20,000 members and a loan portfolio of $1.2 million in 1971 to an aggressive, well-managed federation of 86 affiliated cooperatives with 60,000 members with a loan portfolio of $5.2 million and total assets of $6.5 million as of August, 1975. During the same period, the Federation of Regional Agricultural Cooperatives (FECOAR) was established and has developed into a strong cooperative organization with some 10,900 members and total assets of $5.2 million. In addition to these two organizations, the Penny Foundation has grown with AID support from a small scale operation serving some 2,000 farmers with $92,000 in loan funds in 1970 to a significant provider of agricultural production and land purchase credit for some 5,200 farmers in 1974 with loans totaling Q437,000.

Future USAID programming calls for two loans in FY 1977 in the food and nutrition sector, one to assist the GOG and cooperative organizations in providing marketing and processing services to small farmers producing vegetables and fruits, and another loan to finance county government infrastructure in direct support of agriculture marketing activities such as town markets, slaughterhouses and value added activities at the local level.

From a weak starting point in 1970, the elements of a greatly improved structure for reaching an increasing number of the rural poor with agricultural technical assistance and production credit are in place and functioning. These accomplishments have been noted in four major evaluations of the USAID rural development program conducted over the past two years. The evaluations include: (a) Inter-Country Agricultural Sector Evaluation Study (Hutchinson Report) covering progress through the end of 1973; (b) a 1600 farmer sample survey and accompanying analysis of the impact of credit on small farmers carried out by the LA/DR Sector Analysis Division during 1974; (c) the ATAC (American Technical Assistance Corporation) evaluation of the effectiveness of Guatemalan cooperative institutions as mechanisms for assisting small farmers to increase their productivity and incomes which was carried out in early 1975 (final report is not yet completed); and (d) a summary evaluation of prior AID rural development programs which synthesizes the findings of the three earlier evaluations and assesses the accomplishments of the joint GOG/USAID programs from 1971 through mid-1975. This study was prepared by Dr. Fred Mann, who was a member of both the Hutchinson and ATAC evaluation teams, and a summary is included as an Annex to this Project Paper.

3. IDB-IBRD-AID Tripartite Agriculture Sector Assessment

While still in draft form, preliminary conclusions of the Tripartite agricultural sector assessment conducted in February-March, 1975, coincide largely with the findings of prior AID evaluations. The study emphasizes the need to strengthen the planning and coordinating function within the Public Agricultural Sector as well as the urgency of undertaking programs to relieve the severe population pressure on the overcrowded highlands area.

The team report recommends that a series of labor intensive projects be undertaken which will provide both temporary and long-term employment opportunities in rural areas. The team also recommended that the international

lending agencies support such activities as road construction, beef and dairy cattle production, marketing facilities, small and medium-scale irrigation, fruit and vegetable production and soil conservation and reforestation. The need for institutional and policy changes within the Ministry of Agriculture and the autonomous public sector agencies was emphasized as well as the need for additional capital investment in agriculture and the establishment of a mechanism to facilitate the purchase of land by small-holders and landless laborers. With respect to colonization the report minimizes its importance as a principal solution for relieving the minfundia problem, because the costs associated with such an effort appeared to the team to be out of line with potential benefits. However, potential savings due to new roads being extended into the area as well as alternative means for administering programs more efficiently than in the past were not evaluated by the team.

4. International Donor Agency Response

The IDB is developing a $15 million loan which will be combined with $5 million of GOG counterpart to provide credit to cooperatives and individual farmers through BANDESA and the cooperative federations. Purchase of land will be eligible for financing under the GOG counterpart of the loan. The IDB is also planning future loans for secondary road improvement ($24.0 million), medium-scale irrigation ($11.2 million); animal health ($5.0 million), and artisanal fisheries ($5.0 million).

The World Bank is working with the GOG on development of a loan for secondary education which includes funds for two new agricultural vocational training institutions to be located in the western and northern highlands. A second IBRD livestock loan is also in the planning stages.

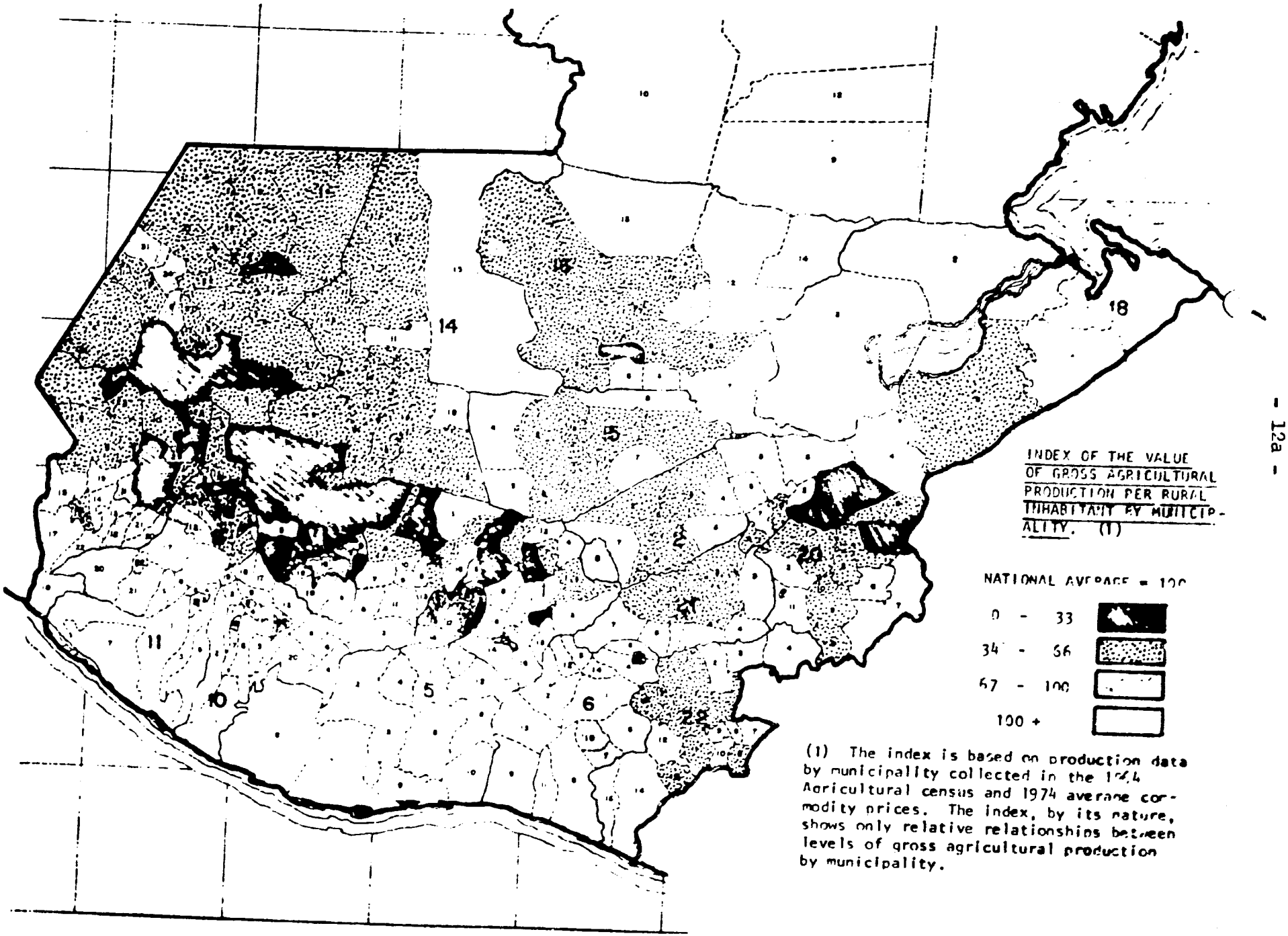
The UNDP is planning to provide technical assistance in agricultural marketing, labor intensive road construction, forestry, and fisheries development as well as assistance to the faculties of Agronomy and Veterinary Medicine at San Carlos University. A joint UNDP/IDB project is underway to provide technical and management assistance for development of handicrafts production in the highlands.

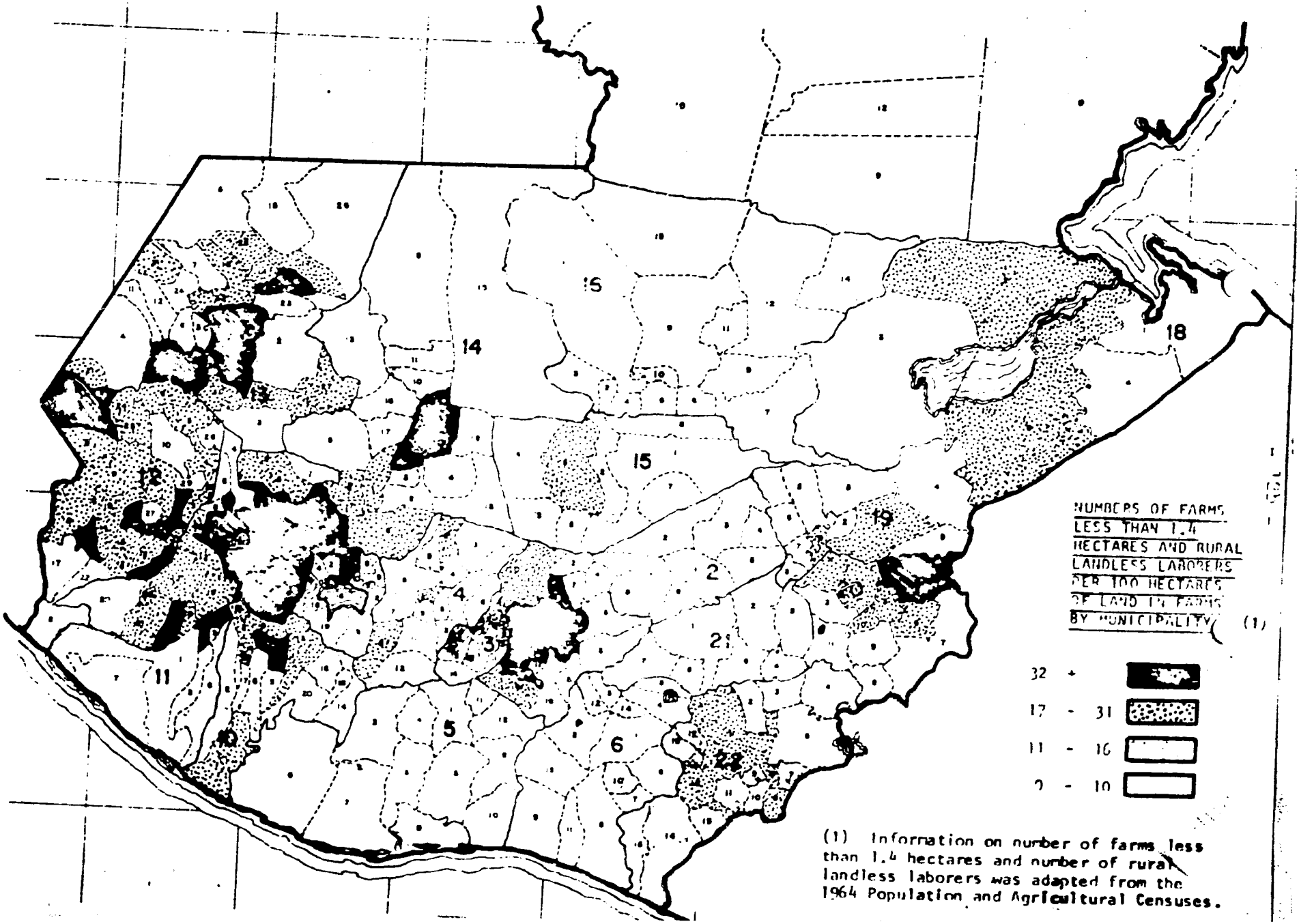
The Canadian Development Agency (CIDA) is planning a $5 million program over the next 4-5 years which will concentrate on grant and loan assistance for forestry, crop diversification by the federation of small coffee grower cooperatives and direct support to the National Economic Planning Council.

5. Project Strategy

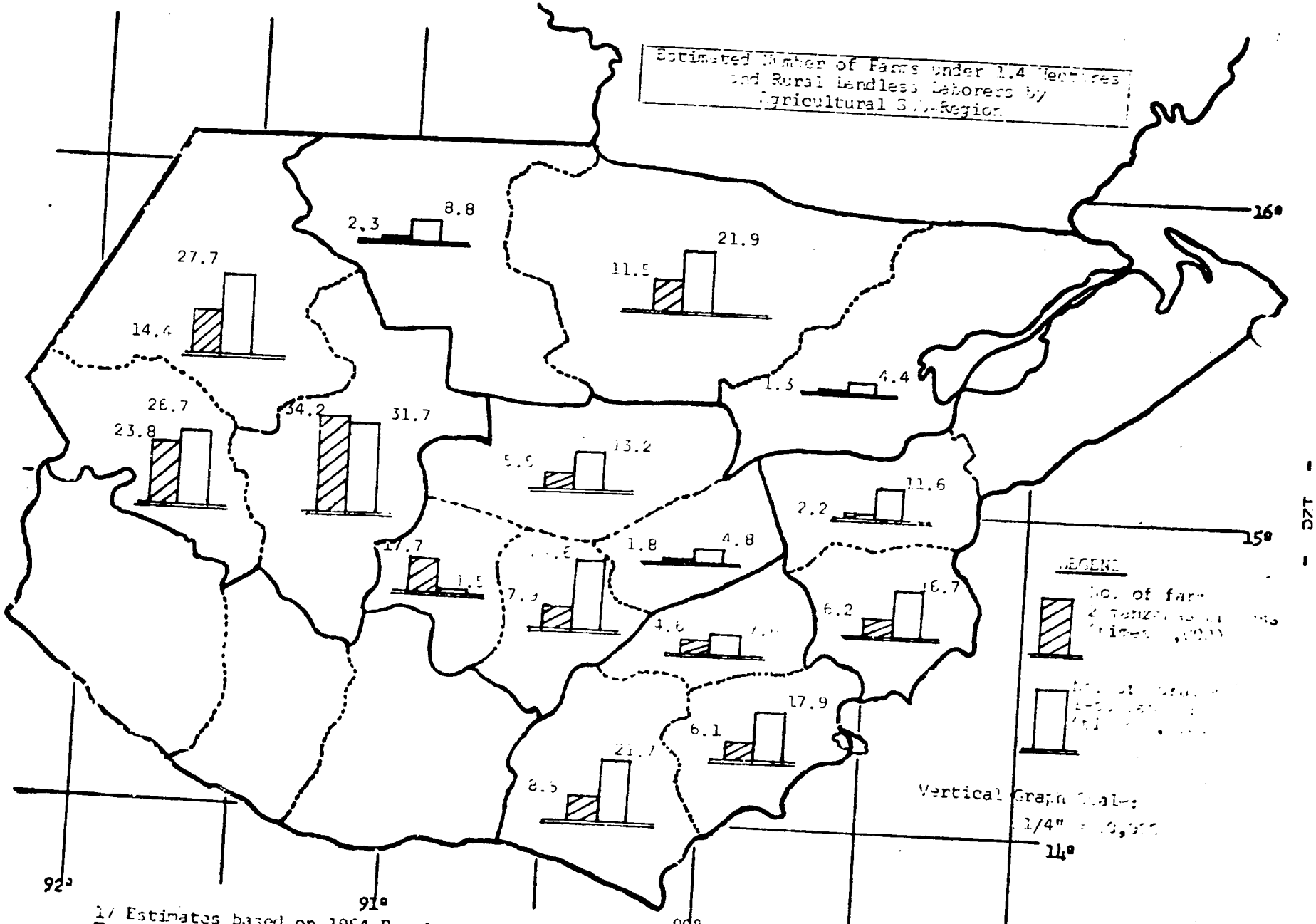
Given the magnitude of the problem--87% of all farms in the highlands are less than seven hectares, and of these more than half are of 1.5 hectares or less; 60% of all rural families have a per capita income of $80 or less; the average wage for farm laborers is 80 cents per day; average size of farms in the highlands is dropping rapidly (50% over last 20 years); there are 200,000 landless laborers,--it is evident that there is no single solution to correcting what could well appear to be a hopeless case. However, we believe there are measures available to the GOG which can alleviate such impacted conditions. Specifically, the Government can provide attractive alternatives to those willing to resettle away from the highlands; it can increase the productivity of those that remain through improved technology and improvements in their land resource base; and it can improve access to inputs, markets and other government services such as health and education. Finally, the government can modify its approach to public works to maximize their employment impact.

The project described in detail on the following pages focuses on relieving the land constraint and improving the productive base in the most densely populated areas of the country. The pilot colonization activity will provide the GOG with an alternative, lower cost approach to settlement of the large tracts of vacant lands in the country. It is expected also to solidify the positions of member owned cooperatives as vehicles for development in rural areas. Other initiatives are designed to assist the government in developing new programs for upgrading land resources through improved conservation practices and irrigation, as well as through improving access. These programs are designed to have a heavy employment generation impact as well. Finally, the project also provides assistance for upgrading public agriculture sector planning and human resource capabilities as a means for increasing the effectiveness of sector institutions in devising and implementing outreach programs. The maps on pages 12a through 12d indicate the impacted geographic areas where most small farms are located and a value per capita index of agricultural production: the first two demonstrate the concurrence of poverty and minifundia; the third map identifies the number and location of the generally sub-viable farmers and the landless poor; the fourth is a geographical schematic representation locating program activities which address the problems of minifundia and lack of employment opportunities. Details of these programs follow.

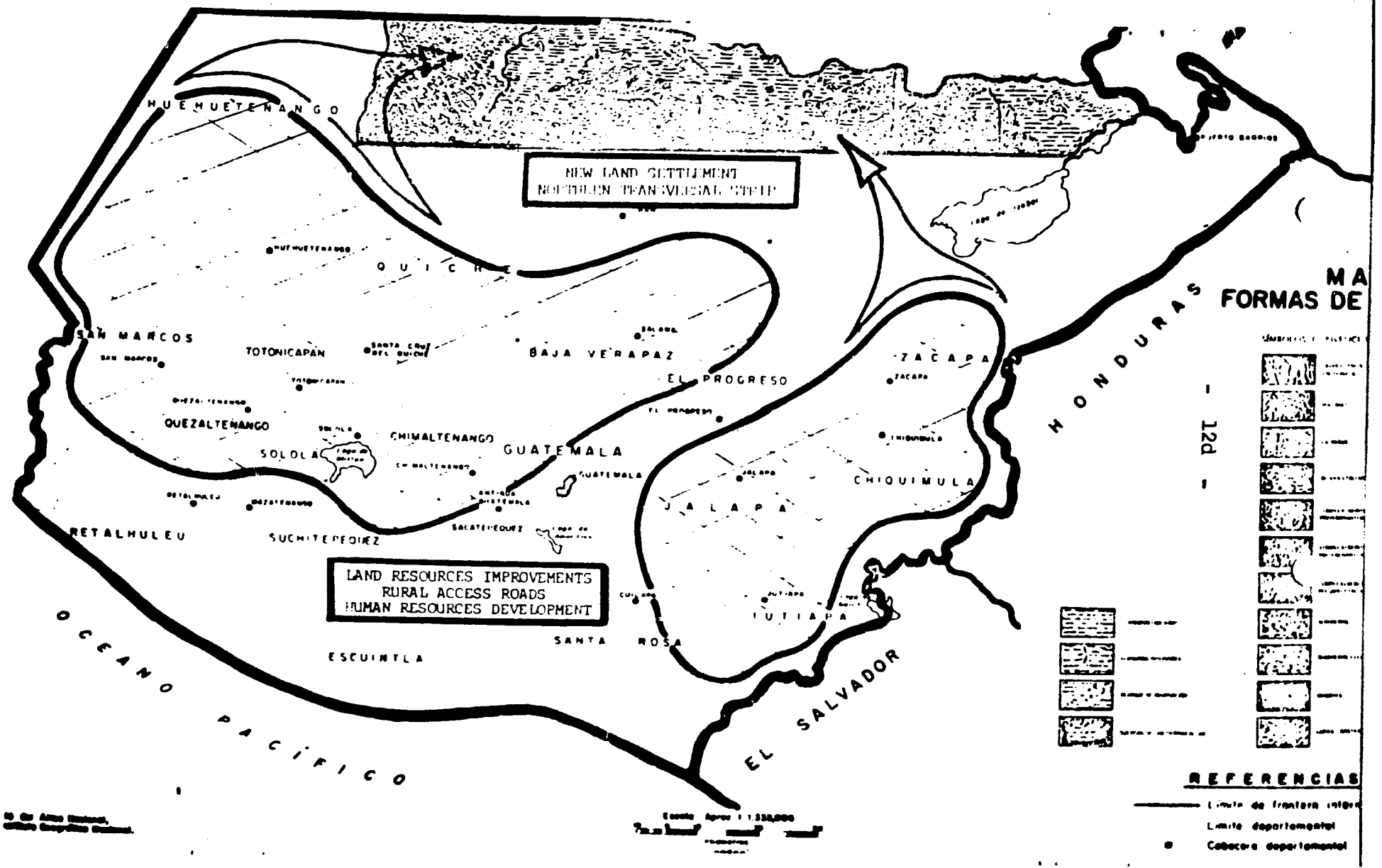

INDEX OF THE VALUE OF GROSS AGRICULTURAL PRODUCTION PER RURAL INHABITANT BY MUNICIPALITY. (1)
NATIONAL AVERAGE = 100
0 - 33
34 - 66
67 - 100
100 +
(1) The index is based on production data by municipality collected in the 1974 Agricultural census and 1974 average commodity prices. The index, by its nature, shows only relative relationships between levels of gross agricultural production by municipality.



(1) Information on number of farms less than 1.4 hectares and number of rural landless laborers was adapted from the 1964 Population and Agricultural Censuses.



1/ Estimates based on 1964 Population and Agricultural Census Data.


MA
FORMAS DE
NEW LAND SETTLEMENT
NORTHERN TRANSVERSAL STRIP
LAND RESOURCES IMPROVEMENTS
RURAL ACCESS ROADS
HUMAN RESOURCES DEVELOPMENT
HUEHUETENANGO
QUICHE
SAN MARCOS
TOTONICAPAN
BAJA VERAPAZ
EL PROGRESO
ZACAPA
QUEZALTENANGO
CHIMALTENANGO
GUATEMALA
SOLOLA
CHIQUIMULA
JALAPA
RETALHULEU
SUCHITEPEQUEZ
JUTIAPA
SANTA ROSA
ESCUINTLA
HONDURAS
EL SALVADOR
OCEANO PACIFICO
REFERENCIAS
Límite de frontera interna
Límite departamental
Cabecera departamental

B. New Lands Settlement

1. Introduction

Since pre-colombian times, the indigenous population of Guatemala has concentrated in the cool highlands of the country where they developed an agriculture based on the cultivation of corn. Following the colonial period the introduction of indigo and later coffee on large farms required the utilization of indigenous labor at lower elevations both as permanent plantation staff and seasonal migratory workers at times of harvest. Nevertheless, the great majority of the Indian population has continued to live in the highlands, maintaining their cultural patterns, language and identity until recent times when modernizing influences coupled with increasing population pressures on the land, have begun to break down these traditional patterns.

The plight of the Guatemalan rural poor is well documented and the relationship between rural poverty and land tenure is clear. There are too many families remaining on small parcels (minifundio) with insufficient land resources to provide a subsistence livelihood. An estimated 87% of all farms have an average size of seven hectares or less. Of these 365,000 farms over half contain less than 1.5 hectares. Approximately 73 percent of the minifundio of the country are located in the target areas of this project where an estimated 200,000 landless laborers also live. The obvious result is a high percentage of underemployment and unemployment with about 60% of the rural population receiving an annual per capita income of less than $80.

Broad averages tend to dull the acuteness of the situation of the rural poor, however. Thyrele Robertson in his report "Minifundio Problems in Guatemala" (July, 1975) (See Annex I , Exhibit 4) has described the essence of the predicament of the rural poor in the Northwestern Highlands. In the Department of Totonicapán, for example, almost 50% of the farms are less than 1.4 hectares in size and 90% have an area of less than 3.5 hectares. The average size of all farms in the Department is only 1.6 hectares. The land tenure situation in eight other Highland Departments is only slightly less critical. According to the GOG Development Plan the average family income of the poorest 50% of the rural population in the highlands is only $218 per year. AID financed studies of small farmers of the region coincide with these

findings. Time series data indicate that the situation of the rural poor continues to deteriorate. The results of a study to identify particularly acute poverty areas of the highlands are documented elsewhere in this Paper.

Past governments have not been oblivious to the problem. The formation of the National Agrarian Transportation Institute (INTA) in 1961, constituted a milestone in GOG agrarian policy and programs of settling families on undeveloped public lands and expropriated farms have been promoted. A large colonization effort begun in the 1950's on the rich South Coast alluvial plains, was absorbed by INTA and presently some 100,000 hectares of arable land are being farmed by families who were originally settled on 20 hectares plots. An AID predecessor agency provided financial assistance for the original investments of land clearing, road building, measurement and establishment of farmsteads. Some of the original intent of the project has been lost, however, as farms have been leased, sub-divided or sold and the population has been less than stable. The average farm size in the colonization tracts is now estimated to be only 10 hectares and the population has grown to 20,000 families living in the area. (The 1975-79 Development Plan recognizes this problem and proposes reforms in the colonization area).

INTA has been the target of widespread criticism since its inception. Claims of favoritism, inefficiency, excessive costs and inept management have been made and this, coupled with the termination of the South Coast projects and drastically reduced budget in 1968, led the agency to concentrate more of its efforts in the north-central region of the country. The management of national farms which, despite a policy of transferral of the lands to resident workers, continues to be largely in INTA's hands and a few experiments in making these farms pseudo cooperatives or collectives have had disappointing results. INTA has distributed some 50,000 hectares of land to 1,353 families since concentrating in the North but the institution has never recovered from the loss of prestige and initiatives it held during the government of Carlos Castillo Armas.

The Petén region, in the extreme northern portion of the country, has been considered by many Guatemalans to represent the solution to land tenure problems for years. A special commission operating directly under presidential authority called "Fomento y Desarrollo de El Petén" (FYDEP) was formed some 15 years ago with the responsibility of opening up this virtually uninhabited region to productive agriculture.

Some roads have been built and land distributed over the years but in August 1975, a presidential order required FYDEP to elaborate a cohesive plan in conjunction with the National Planning Council and INTA before further land distribution is made. The concession of large blocks of land by FYDEP to persons principally motivated by speculative opportunities has been the principal reason for the order to realign the objectives of land development to include the social and economic requirements of small and medium-sized farmers.

The recent presidential order to FYDEP is indicative of a change in GOG policies aimed at a more rational and equitable distribution of land resources. The GOG is also aware that unregulated exploitation of these tropical lowlands will result in irreparable damage to the ecosystem and that an effective approach to colonization is required if the remaining land resources of the country are to be utilized to establish significant numbers of the Guatemalan rural population in productive agriculture.

Clearly, the resettlement project proposed in this paper will not solve all of the problems of minifundio in Guatemala. Rather it is an attempt to set patterns of settlement in an area of public lands specifically reserved for this purpose. The project design has been developed in conjunction with the National Planning Council to reach the following objectives:

a. To provide access to newly opened lands to the rural poor.

b. To reduce the level of public investment per family for infrastructure to the essential requirements of access, health and educational facilities.

c. To distribute land parcels of limited size which may be managed and worked adequately by a single farm family unit.

d. To permit, within the limits of rational land management, the recognized benefits of spontaneous settlement, holding government intervention to a minimum.

e. To utilize and adapt farmer organizations which have been developed in the highlands in the process of selection of eligible families, coordination of the settling, establishment of rules and the provision of essential services to agriculture.

f. To streamline the delivery of services of technical assistance, credit, supply and marketing by channeling them through farmers' organizations made up of the settlers.

There are reasons to be optimistic that these objectives can be met. Principal among these is the fact that, with some small differences, it has already been done on a limited scale by the Maryknoll Fathers. With limited financial resources, the Fathers have settled 2,000 families on about 30,000 hectares of land in the Ixcan region over the past four years. The people were recruited in the highlands around Huehuetenango and have adjusted satisfactorily. With very little external guidance and support, the families have begun to establish productive agriculture, internal government and modest trading centers. Although there is no highway access to Ixcan, no public credit, and health and educational facilities are rudimentary at best, few families have returned to the highlands and the waiting list to settle in the area far exceeds the available land resources remaining. The experience of this successful project has been, and will continue to be, consulted in the execution of this project.

2. Strategy

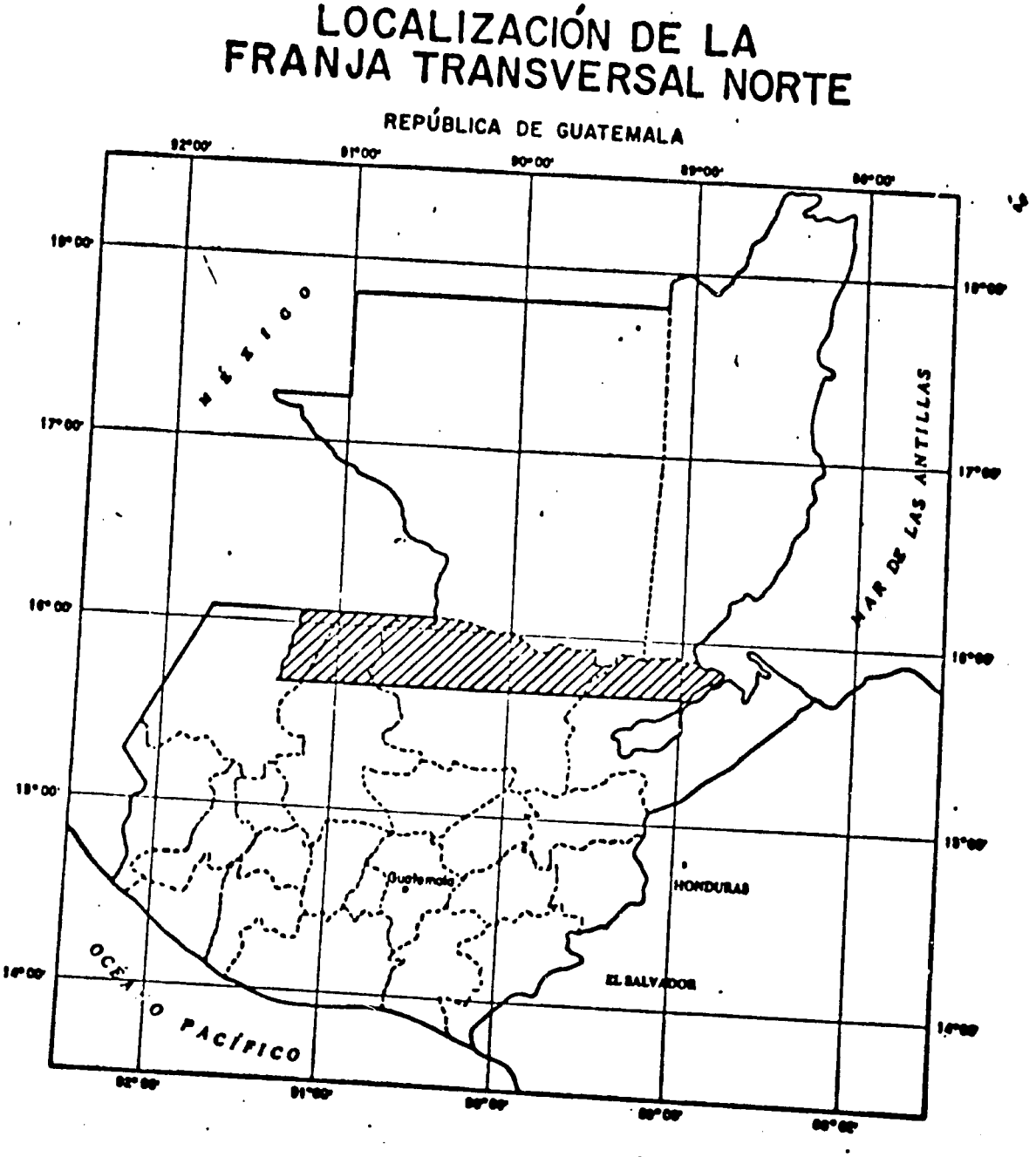
The overall strategy of this activity is to help the GOG initiate a new approach for settling undeveloped lands by developing a pilot colonization area and providing the information necessary for implementing the expansion of this program to other areas. The program is designed to help the GOG move away from the present cumbersome, paternalistic and closely guided approach to new lands settlement practiced by INTA to a more open, spontaneous settlement program carried out by organized cooperative groups supported by GOG agencies. It is proposed to open approximately 50,000 hectares of new land and settle 5,000 families within the loan implementation period and develop the information, plans and institutional capacity for extending the settlement program to an additional 540,000 hectares during the 1980's.

3. The Program

a. The Target Area

Of the different possibilities for settling farmers on new lands, the Northern Transversal Strip (NTS) has been selected by the National Planning Council for the first efforts. This strip (see map following page) includes some 914,000 hectares running east and west across the north-central portion of the country. Studies indicate that over

THE LOCATION of the NORTHERN TRANSVERSAL STRIP IN THE COUNTRY



half of this land, or about 590,000 hectares is potentially cultivatable and could support a much better livelihood than is currently possible for the vast majority of highland residents. Land quality and adaptability for farming vary in the NTS yet the estimates are that some 60,000 farmsteads could be established.

In addition to the settlement sponsored by the Maryknoll Fathers in Ixcan at the extreme western end of the NTS, INTA has located some 1,350 families in the villages of Sebol, Fray Bartolomé and Raxrujá in the central part of the zone. INTA has awarded parcels averaging about 20 hectares to these families of which some 60 to 70 percent is arable. In addition INTA has collaborated with privately organized groups in a sporadic fashion located in the western portion of the NTS.

Highway access to the NTS is currently limited to a main artery which connects to the rest of the country through Cobán. A highway is being built eastward from Sebol to connect with the Petén highway at Modesto Méndez and a new road has recently been completed west to Rubelsanto by the Shennandoah Oil Company to provide access to their drilling site there. The oil company will expand the road further west for exploration purposes in early 1976. The resulting road network will make possible the opening of colonization areas at considerably lower cost than had been anticipated.

An airstrip capable of supporting C-130 aircraft has been constructed at Rubelsanto and a number of small airfields that accommodate light aircraft are located throughout the Western part of the NTS.

b. Role of GOC Agencies

INTA has legal authority to survey and acquire land from the public domain and to distribute this land to individual settlers. Under this project, INTA will survey and title project land and the cooperatives will take responsibility for settlement and development. The cooperatives and colonists, in turn, will rely upon various GOG agriculture sector agencies for assistance in their respective areas of expertise. For example, BANDESA will provide credit for production and investment purposes, ICTA and DIGESA technical assistance with respect to crop recommendations, and INDECA for assistance in establishing marketing channels and storage facilities for production. The

cooperatives will be responsible for settler selection and internal organization along general guidelines agreed upon between them and the GOG.

c. Legal Implications

The National Planning Council has stated that no legal reforms are necessary in order to transfer large tracts of land to cooperatives. A precedent has been established in the case of the Maryknoll settlement at Ixcán where INTA did transfer a block of land with title vested in the cooperative organized there. A national cooperative leader (a lawyer familiar with agrarian and cooperative legislation) has stated that existing legislation does not contain any limitations to ownership and management of land by cooperatives.

d. Access

A lack of easy access is the primary reason why the area has not been settled. Present settlements at the western end of the NTS are accessible only by light plane or on foot, a two-day walk at best to the nearest road at Barrillas which connects with Hueheutenango. Nevertheless, the lack of access has had the advantage of preserving the area for organized settlement programs.

While roads are essential over the long-term for marketing of production, the early stages of settlement under this loan will not require extensive road construction. Because the oil company with concessions in the area plans to construct a road nearby beginning in early 1976, it is planned to limit road construction to be financed under this loan to access roads from the settlement areas to the company's all-weather road. It is estimated that about 40 kilometers of all-weather penetration roads will be required at a construction cost of about $15,000 per kilometer or a total of $600,000 to be financed from the loan.

The initial phase of settlement does not envision the construction of a road or trail by each farm gate. Within the settlement areas, land transportation access from the nearest all-weather road to the farm site will be a future development consideration. Right-of-ways for trails will be provided for so that they may be up-graded over time. The use of surplus family labor to construct and improve access will be used to the maximum extent possible.

e. Program Approach

Past experience in other countries indicates that settlement projects of a spontaneous nature have been most successful and have taken place at least cost to governments. Accordingly, the design for this project has been kept as close to that concept as possible. This means that approximately one-fourth of the cost, excluding roads, will be absorbed by the settlers primarily through contributions in the form of labor. Preliminary calculations indicate that total cost, not including roads, for the 5,000 families to be settled by this project will approximate $9.9 million, of which 25 percent would be contributed by settlers, with the remainder being financed by the loan and GOG counterpart.

Settlers will absorb the costs of land clearing and erection of farm buildings utilizing materials salvaged from land clearing. This is estimated to cost about $2.5 million for 5,000 farms during the disbursement period. Public agricultural sector agencies will provide technical assistance at an estimated cost of about $960,000 with an additional $100,000 allocated from the loan for housing for the technicians and equipment support. The requirements for services and facilities to support settlement are estimated at $3.88 million. This would be in the form of grants and loans to cooperatives charged with carrying out the project and would cover the cost of such basic elements as: minimum community cooperative facilities and services, agricultural credit, parcel surveys, access trails, etc. Direct payment to settlers for certain labor costs associated with construction of community facilities is included to provide an initial source of income until land can be cleared and crops planted and harvested. The services provided for the new settlers will also be available for use by an estimated 4,000 families presently isolated in the area.

A settlement analysis has been made by two consultants based on a projected group of 5,600 families and included a social-benefit cost analysis. Given an assumed discount rate of 12 percent and a project life of 20 years, the B/C ratio ranges from 7.7 to 4.1 depending on whether or not the cost of the primary access roads is included. The consultants recommended that road costs should not be charged against cost of the initial settlement since future settlers would also benefit from this investment. Consultants report is submitted as Annex Z Exhibit 2.

The GOG has indicated to the Mission that the Cooperative Federations as well as individual cooperatives will be eligible to participate in the organization and operation of the new settlements. Existing cooperative groups will be responsible for identifying and selecting families who will participate in the project. The objective will be to organize one new cooperative in each of the three parcels to be settled with initial management direction being provided through the parent Federation or cooperative group. Once the new cooperatives have been legally established, provisional title to the parcels, which will be in the name of the parent Federation or cooperative group, will then be transferred to the new cooperatives.

The GOG will sell specified tracts of land to the sponsoring Federations or cooperative groups under agreements which will incorporate provisions governing such matters as use to be made of the land by the cooperatives, guidelines for land tenure and transfer of title to individual tracts, form and time of payment, services that the GOG will provide, and other pertinent matters. From this point, the Federations or cooperative groups will be responsible for settling and developing the land in an efficient and economical manner.

The settler cooperatives will function as independent entities with member participation in the decision-making process. While the GOG will assist the cooperatives with development and settlement, decision-making will be cooperative responsibility.

Upon consummating agreements with the government the Federation and cooperatives will proceed with the settlement effort in the following manner:

(1) Publicity

Informational campaigns will be conceived to present an accurate and carefully explained picture of the opportunity for resettlement. Sponsoring groups will devise an orderly system to disseminate the information, train the communicators and provide as much material as possible on the selected area. Departments of preference will be El Quiché, Sololá, Totonicapán, Quezaltenango, Chimaltenango and selected areas of Huehuetenango and San Marcos. Participants in the projects already begun in the Ixcan region will be recruited to "tell it like it is" to interested groups in the highlands.

(2) Screening

Following the basic guidelines of eligibility established in the agreement between the GOG and the cooperatives, groups of candidates will be assembled at different times during the settlement phase of the project for orientation and training. Meetings or short courses for candidates will be organized which will include:

(a) Objectives of the project.
(b) Responsibilities of participants.
(c) General rules and regulations.
(d) Obligations of the GOG and sponsoring cooperatives and Federations.
(e) Caveats.
(f) Feedback, answering doubts.
(g) Graphic descriptions of what the area is like and status of those who have gone on before.

(3) Design of the Settlement Area

Initially, a limited number of land parcels which will accommodate approximately 850 farmsteads each will be defined within the settlement area, with additional blocks being added as the project progresses. The cooperatives will be responsible for designing the land use pattern, and infrastructure required for each assigned block. A map showing details of each element of design and measurements will be prepared before the cooperatives are permitted to begin clearing, construction and assigning lands for exploitation. The design shall be such that major investments such as roads, bridges, airstrips, etc., may be utilized in an efficient manner. The conservation of natural resources will also be contemplated in the design and the GOG will have the right to insist upon areas of forest reserves, watershed protection, measures for erosion control, etc. When the design of the blocks is completed, the cooperatives will have the freedom to transport settlers to the site to begin clearing, measuring, building and establishing the settlements.

(4) Land Management

The entire land area within the boundaries of each block will be legally titled in the name of the responsible cooperative or Federation. It will be the function

of the sponsoring groups to organize and supervise crews to undertake the initial clearing and provide for their welfare until they are able to provide themselves with their own shelter and food. Initial workers (and eventual colonizers) will be paid for their work either in cash or kind.

Lands which serve the general interest of the settlement such as, forest reserves, urbanized areas, parks, roads, and agricultural experimentation areas, will be the responsibility of the Federation to establish and maintain.

(5) Parceling and Settling

As the settlement block begins to take form with the layout of roads, communities, etc., it will be the function of the sponsoring groups to begin measurement and marking of individual parcels of land to be assigned to participating family units.

For purposes of communication and services (and probably preferences of the people themselves) it is important to design residential plots in a fairly concentrated area. The experience to date in established cooperatives in the highlands indicates that the natural "aldea" or "caserío" grouping of farm residences is convenient for cooperative activities such as education, credit planning, programming services, receiving complaints, etc.

The individual plots or family parcels need not be exactly the same size nor shape; the important aspect of parceling from the point of view of cooperative organization is that farmers live where they can be reached fairly easily and that each parcel have roughly the same gross productive potential sufficient to sustain a family at a reasonable standard of living.

The sponsoring groups will proceed to assign plots or parcels to be worked by a family unit under a usufruct agreement with the participating colonizer. Assignments will be recorded complete with measurements, boundary identification, location and maintained in a detailed map for reference. The same procedures will be followed for assigning spaces within the community groupings wherein families may establish their principal households, have a garden, store products, maintain domestic animals, etc.

For purposes of participation in the affairs of the project in a cooperative fashion, the assignment

to a parcel of land will be tantamount to acceptance of membership to the cooperative entity responsible for the overall management, discipline and support activities as conceived in this proposal.

(6) Organization and Internal Government

Soon after parceling and settling of families begin, the sponsoring groups will proceed to divest themselves from direct operational authority in each block by first organizing a legally chartered cooperative designed specifically to manage the affairs of the block, support its members and enter into direct legal responsibility with external parties involved with the project. It is foreseen that the role of the sponsors will be only temporary and each individual cooperative enterprise will assume the legal, financial and operational responsibilities started for it.

The organizational structure of the cooperatives should be flexible and adaptable to the needs of their members and the changing role of the cooperatives over time. Cooperative law in Guatemala requires elements of organizational structure but these should not be onerous for cooperatives in this project. The most unusual or non-traditional aspect of the organizations in this project will be that of internal government. The cooperatives will become a combination of landlord, manager, municipality, representative and monitor of the affairs of the project in addition to the more traditional role of agricultural cooperatives in supply and marketing. A key aspect of organization will be, therefore, the contact with and communication between community centers where members live. It is suggested that each community have its own organization with elected leaders or representatives to the central administration.

(7) Cooperative Services in Agriculture

The agriculture to be practiced in the NTS region will be very different from that commonly practiced in the highlands where the settlers will come from. The job of orienting farmers to understand the capacities of the land they settle, its limitations and potential will have to fall to the cooperative organization. Likewise, the support of agriculture with credit, inputs and marketing should be the role of the cooperative organization. Research, trials and technical orientation and analysis will be beyond the capacity of the cooperative staff and this type of support will have to be supplied directly by the GOG.

A proposed list of cooperative functions in support of agriculture follows:

(a) Agricultural orientation. Farmers will have to receive advice, "technical assistance", and be given help in decisions on crops to plant, their care, and preparation of products for market. In some cases, prohibitions may have to be established in order to conserve the land resources. The cooperative should also support demonstrations and trials on member farms.

(b) Credit. It is expected that every farmer will hold a line of credit with his cooperative. This credit will have three components: (i) long-term obligation for the purchase of his land; (ii) medium-term credit for farm improvements, animals, nursery stock, buildings, etc., and (iii) short-term credit for annual crops.

(c) Supply. The cooperative should be the principal source of farm inputs, including nursery stock and breeding animals, if required by member-farmers. The cooperative should maintain stores for these items within its jurisdiction.

(d) Marketing. As commercial agricultural production comes on stream, the cooperative should be the principal marketing agent for the area of its landholdings. Arrangements will have to be made for assembly,grading, processing, storage, packaging and sale. Through this activity, the cooperative should not only offer economic advantages to farmer-members but also assure the recovery of credit extended to members.

(e) Production. Under the guidance or supervision of ICTA, the cooperative should undertake the production of some materials to be sold to members. Principal items in this service will likely be seed, nursery stock of citrus, cardamon, etc., and possibly breeding stock of domestic animals.

(f) Disease Control. There may be instances in which the cooperative will find it necessary to undertake campaigns of general control of diseases and insect pests which affect the area of its operation.

(g) Infrastructure. It may be desirable for the cooperative to invest in certain elements of agricultural infrastructure for the direct benefit of its members. Examples of items which will be required are drying facilities, simple harvesting equipment, bridges or rafts, loading chutes, pens, etc.

(h) External Assistance. The cooperative should become the principal instrument for utilizing and distributing external assistance in the form of technical services, donations and relations with the agricultural public sector of Guatemala.

f. Program Implementation

The project will be carried out in three stages as follows:

(1) Settlement of 2,000 families on 19,000 hectares of land to which INTA already has title will begin immediately with initiation of loan implementation. The land, consisting of three parcels, has already been surveyed. Potential productivity has been determined and compared with land in adjacent tracts which has already been settled. Time required for clearing, the crop mix and potential profitability has been

calculated; (Schreiner and Flood, "Framework for Analysis and Planning of New Lands Settlement for the Franja Transversal", August, 1975). These estimates anticipate that from the first year, the income of settler families will improve greatly over what it is in the highlands, totaling $400 per family (net returns to all resources) in the first year rising to $1,000 in the fifth year. The studies and calculations are based on the experience of present settlers and assume that crops grown and methods of production will not change much during the initial settlement period while infrastructure is being developed. After the third year improved crop mix and technology are anticipated.

(2) Concurrent with initiation of settlement of the first 2,000 families in the area, semi-detailed studies including natural resources, land use and a cadaster will be initiated on a 30,000 hectare tract adjacent to the first settlement area. On completion, the second settlement phase will begin whereupon an additional 3,000 families will be settled bringing the total to 5,000 over the life of the loan.

(3) The final phase involves continuation of the studies begun under "(2)" above to cover the remaining 541,000 hectares in the NTS region. Added, however, will be a requirement for preparation of a development plan for settlement of the remaining NTS suitable for colonization (as determined by the various studies). (Annex I indicates the areas ready for immediate settlement and lands potentially available for future settlement after studies have been completed).

Both aerial photography and ground correlation work will be required on a 6,000 square kilometer area in order to develop a semi-detailed natural resources study and prepare 1:50,000 land use maps. A cadaster of the area is also considered essential in order to define the precise location of an estimated 4,400 square kilometers of the public domain, 600 square kilometers of occupied lands, and an additional 1,000 square kilometers in what is denominated as "national farms". Preliminary observations and a review of available information indicates that the area is uninhabited and largely untitled but complete and accurate information remains to be developed.

Scopes of work for the necessary resources background studies are now being prepared. It is estimated that this work would be performed by contract and that two years would be required for completion after receipt of aerial

photography and/or satellite imagery. The possibility of using ERTS satellite imagery and information in conjunction with lower level aerial photography is being investigated.

The National Planning Council estimates that the total project could benefit as many as 70,000 rural families, including those in the area at the present time.

If this model proves successful in settlement of new lands it will be used for the balance of the transversal strip, as well as for the arable land area in the Department of the Petén.

g. Technical Assistance

To provide guidance and assistance in expanding managerial capacity to encompass formation of the new cooperatives and in planning the settlement schemes, grant funding in the amount of $435,000 will be relied upon to provide technical assistance to the cooperatives. This will provide for the services of a cooperative management specialist and a settlement planning specialist for a period of about three years each and about nine months of short-term specialized assistance for design and installation of such service facilities as crop dryers, storage facilities, sawmills, nurseries and an array of social infrastructure facilities as well.

C. Access Road Improvement/Employment Generation

1. Introduction

A map of the 13,500 Km. primary and secondary road network appears to cover most of the rural areas, but in reality, the incidence of heavy, broken topography denies direct farm-to-market transportation to all but those who farm the corridors immediately adjacent to the existing roads. While considerable investments have been made for transportation infrastructure in the past twenty years, most of the funds have been applied to the upgrading and paving of the major arterials (Pan-American, Coastal and East-West Highways).

Thus, the primary highways are in good condition and can provide reasonable cost inter-regional transportation for agricultural sector activities. However, they are not supported by a secondary, tertiary and farm-to-market feeder road system which can maximize their utility for accelerating general rural development and increasing agricultural productivity. These road improvements will provide additional transportation capacity needed by the rural poor and support the movement of small farmers into the production of higher value crops. While the expansion of the rural secondary and tertiary road network is not in itself a sufficient input to increase productivity and net incomes, it is a necessary element and will contribute towards these objectives in several ways:

a. Improve farmer's access to and the availability of necessary agricultural inputs;

b. Reduce unit transportation costs associated with crop inputs and market oriented production;

c. Provide dependable and more frequent links with production associations and marketing centers;

d. Allow an increase in area coverage by various public and private sector technical/development extension support services;

e. Improve the regional mobility of excess rural labor resources;

f. Increase short term employment opportunities and cash incomes for landless and needy rural poor by constructing and maintaining these improvements using labor intensive methods; and,

g. Assist the GOG in developing a capacity to organize for and carry out labor intensive projects in other programs - conservation, irrigation, etc.

Dependable access is also a prerequisite for the growth of other government sponsored rural socio-economic development programs (Health, Education, Population Management, Municipal Development, etc.) aimed at improving rural public services and the overall well-being of the rural poor.

Finally, many of the areas which now have no roads or need improved access also have considerable numbers of unemployed or underemployed people who must seek outside employment to support themselves and their families. These people will benefit directly from cash income employment opportunities created by road improvement and other labor intensive projects. While some of the longer projects or those with larger quantities of earthwork would need varying levels of equipment assistance to economically execute the work, a considerable portion of the work can be done by labor intensive methods. The construction of these roads will also provide labor intensive employment opportunities in the future for the annual maintenance work on the expanded road system. (See Economic Analysis section for benefit/cost calculations of labor intensive construction model.)

The GOG's 1975-79 Development Plan proposes an allocation of $18 million for Rural Roads and $15 million for Maintenance and Improvement out of a total highways investment budget of $183 million. AID and the Inter-American Development Bank (IDB) were requested to finance the Rural Road and Maintenance and Improvement projects.

A general division of labor was agreed upon whereby IDB will concentrate on financing the construction of rural secondary access roads and AID on the tertiary and farm-to-market feeder roads. As a result of our conversations, the IDB has indicated its willingness to move away from road projects in the more affluent and commercial South Coast and concentrate its project financing in the heavily populated areas of the Highlands, Oriente and Northern regions. From the GOG's overall program list of 857 kilometers of roads

approximately 300 kilometers of secondary roads and 280 kilometers of tertiary and feeder roads have been selected for financing by IDB and AID respectively.

The criteria used in selection supported two objectives: (1) the provision of adequate access to concentrations of small farmers and, (2) the location of projects such that they can be constructed to the maximum extent practicable with locally available excess labor. A number of other important elements were also included among the selection criteria and area maps were obtained or developed representing the incidence of:

a. Excess population density;

b. Insufficient income levels;

c. Isolation from existing road network;

d. Land use and potential; and

e. Number of rural poor per unit of cultivated land.

An examination was also made as to the type of terrain traversed by the road projects on a relief map and consideration was given to the estimated cost, potential long run use of the roads and their relationship to District Highway Department construction and maintenance units. A number of the roads have been reviewed on the ground by the Highway Department and USAID personnel to evaluate the validity of the selection criteria. Ground reconnaissance included a confirmation of the work to be performed and the cost projections presented in the Highway Department surveys and Tripartite review. Some of the area identification and road evaluation maps are included in Annex B to this report, along with a map of the proposed road program.

The following table contains the various criteria by which the prospective road sub-projects were selected. Each item has a numerical range all of which are combined, to provide aggregate numerical characteristics. The characteristics are then rank ordered, providing a preliminary selection process for further financial and economic review.

Road Selection Criteria

Criteria	Sub-Criteria	Adjustment Index	Points Min.	Points Total Max
1. Project Objective (Goal)	a) Agricultural Devel.		8	
	b) Social Development		5	20
	c) Improve transporting conditions		5	
	d) Tourist Development		2	
2. Potential Use of Land				
	a. Good - more than 50% exploited	0.4	11	
	less than 50% exploited	1.0		
	b. Average more than 50% exploited	0.4	7	11
	less than 50% exploited	1.0		
	c. Poor - more than 50% exploited	0.4	4	
	less than 50% exploited	1.0		
3. Production Incentives	a) Infrastructure (access, drainage, irrigation, storage, etc.		5	10
	b) Social (services, housing, etc.)		5	
4. Population Density Pop/Km^2	Up to 50		4	
	51 to 100		6	8
	Greater than 100		8	
5. Complementary development programs in zone of influence	a) Agriculture extension		1	
	b) Agricultural credit		1	
	c) Community Devel.		1	5
	d) Agricultural Coops		1	
	e) Others		1	
6. Beneficiaries	a) Small number of individuals		1	
	b) Community		4	4
7. Indirect influence on other areas	a) Exists		2	
	b) Does not exist		0	2
	MAXIMUM POINTS:			60

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USAID feels that the criteria and procedures developed have resulted in the identification of those road projects which address the market access needs of the small farmers, service concentrations of rural population and create alternative employment opportunities for the rural poor. In addition, economic analyses can be made on the proposed roads which will indicate with reasonable confidence whether or not the road is justified and provide some means to examine relative priority. This method of analysis is discussed in more detail in Part III and Annex B of this Paper.

2. The Project

a. General

The project contemplates the construction of approximately 280 Kms. of access roads to be located in the highland, oriente and northern lowlands regions. The roads range from 2 to 23 Kms. in length and fall into three general categories:

Type I - A new minimum standard, all-weather road which in most cases will replace foot trails into remote and isolated areas.

Type II - The upgrading of existing service tracks and feeder roads to all weather tertiary road standards.

Type III - Minor upgrading and the elimination of particular bottlenecks on existing service tracks such that the track can serve as a year-round farm-to-market feeder road. (Examples: minor realignment of steep grades, installation of low water bridges, improve travelled way and drainage ditches, etc.)

The following design standards have been developed:

	Secondary	Tertiary	Farm-to-Market
Vehicles per Day	100	50	15
Design Velocity-Km/Hr			
Flat terrain	40	40	30
Rolling Terrain	30	30	20
Mountainous Terrain	20	20	10
Minimum Radius - Mtrs.			
Flat Terrain	47	47	47
Rolling Terrain	30	30	30
Mountainous Terrain	18	18	18
Maximum Grades - Mtrs.			
Flat Terrain	8	10	10
Rolling Terrain	10	12	14
Mountainous Terrain	12	14	18
Section - Meters			
Right of Way Width	15	12	12
Sub Grade Width	9	5	5
Roadway Width	5.5	4	3.6

Drainage Structures

Minor - Concrete Pipe, Stone Headwalls
Major - Fords where possible, stone or wooden

Construction of the roads will be carried out by both private contractors and by Highway Department "force account" construction. It is contemplated that Type I and II roads over ten kilometers in length will be constructed by private contractors. Approximately 35% of the roads in the project fall into this category. This leaves Class I and II roads under 10 Kms. and all Class III roads to be constructed by force account by the Highway Department. Approrimately 65% of the roads in the project fall into this category. A private consultant will review and approve contract documents, monitor construction, certify payments and make final inspections.

For those roads constructed by private firms, surveys, designs and cost estimates will be prepared and the roads will be contracted for using normal bidding procedures, but with the maximum labor input practicable under the conditions. The force account work will be carried out using existing procedures, except that loan funds will be used to pay for quantifiable outputs (i.e. bridges, culverts, drainage structures, ditches, surfacing materials, etc.) and some equipment inputs. GOG funds will largely be applied to administration and labor inputs for clearing, earthwork, etc.

By financing quantifiable outputs (structures, etc., mentioned above), USAID feels that a modified application of the Fixed Amount Reimbursement method of payment can be used.

The tripartite team and the Highways Department have developed preliminary cost estimates on the three different types of construction proposed. The following are the estimates for construction costs per kilometer, including a 10% compounded inflationary expectation.

	1977	1978	1979	1980
Type I - New Roads				
A. Flat Terrain	23,630	26,000	28,730	31,760
B. Rolling Terrain	29,540	32,500	35,920	39,700
C. Mountainous Terrain	35,450	39,000	43,100	47,630
Type II - Major Up-Grading				
A. Flat Terrain	10,900	12,00	13,260	14,650
B. Rolling Terrain	13,630	15,000	16,580	18,320
C. Mountainous Terrain	16,360	18,000	19,890	22,000
Type III - Minor Up-Grading				
A. Flat Terrain	6,450	7,100	7,840	8,670
B. Rolling Terrain	8,000	8,800	9,720	10,750
C. Mountainous Terrain	9,450	10,400	11,490	12,700

b. Labor and Equipment Requirements

The typical road systems contemplated for construction herein will require some equipment inputs and skilled and unskilled labor complements. Based upon peak demand requirements as outlined in the Labor Intensive PERT/Management study (Annex E), the following equipment will be required for the six construction units proposed:

Equipment Requirement
For 6-Construction Spreads

Type	No. Required	*Cost
D6C Crawler Tractors w/ripper	6	$ 494,500
3 Yd. Dump Trucks	24	414,000
1½ C.Y. Front-End Loaders	6	247,020
120G Graders w/Scarifier	6	345,000
Farm-All Tractors w/Vibrating Roller	6	140,400
Water Trucks w/Pump	6	89,700
1/3 Yd. Concrete Mixer (Trailer Mounted)	6	13,800
Tilt-Trailers for D6's	6	42,000
4-Wheel Drive Pick-up 1½Ton	6	48,300
Hand Tools (shovels, pick-mattocks, rakes, wheelbarrows, misc.)	-	48,000
Sub-Total		$1,882,720
plus 17% spare parts		320,062
Total		$2,202,782

Based on an alternative that the D6C Crawler Tractors and trailers could be rented in country instead of purchased, the rental cost is estimated at $466,000 (includes 15% inflation over the current market). The comparison between purchasing all equipment versus renting the crawler tractors (with transportation charges) is:

Purchasing all equipment	$ 2.2 Million
Renting tractors/trailers, purchasing the rest of the equipment	2.05 Million

*Cost includes CIF charges (Guatemala) and 15% inflation factor.

Labor requirements will approach 190 unskilled laborers and 45 skilled laborers per construction unit. The financial cost estimates and projected disbursements for labor and hand tools are summarized below.

SUMMARY OF LABOR REQUIREMENTS

	AID	GOG	TOTAL
Unskilled labor	$ -	$ 471,160	$ 471,160
Skilled labor	-	576,540	576,540
Hand tools	48,000	-	48,000
Materials, etc.	60,000	20,000	80,000
TOTAL	$108,000	$1,067,700	$1,175,700

LABOR INTENSIVE EXPENDITURES PROJECTIONS
(in 000's of $)

	1977	1978	1979	1980	TOTAL
GOG Contribution					
Unskilled labor	98	108	133	133	472
Skilled labor	124	134	159	159	576
Miscellaneous Materials	10	10	-	-	20
Sub-Total	232	252	292	292	1068
AID Loan					
Hand Tools	18	10	10	10	48
Miscellaneous Materials	10	20	20	10	60
Sub-Total	28	30	30	20	108
TOTAL	260	282	322	312	1176

c. Financial Plan

Based on the proposed project list, the overall construction budget would be as follows:

SUMMARY FINANCIAL PLAN
(in 000's of $)

	AID	GOG	TOTAL
Engineering	$ -	$ 150	$ 150
Supervision	330	-	330
Administration	-	260	260
Construction	4,570	1,680	6,250
TOTAL	4,900	2,090	6,990

FINANCIAL PROJECTIONS
(in 000's of $)

	1977	1978	1979	1980	TOTAL
AID Loan					
Construction	715	1132	1403	1320	4570
Supervision	45	72	108	105	330
GOG Counterpart					
Engineering	100	25	15	10	150
Administration	35	77	87	61	260
Construction	332	420	455	473	1680
TOTAL	1227	1726	2068	1969	6990

d. Organizational Requirements and Development

The Dirección General de Caminos (DGC) was created by Government Decree on May 28, 1930. It is a dependency of the Ministry of Communications and Public Works and is responsible for the planning, design, construction and maintenance of all national roads and bridges. The DGC is presently divided into six departments: (1) Director's Office, (2) Design, (3) Construction, (4) Maintenance, (5) Finance and (6) Administration.

The Technical Division is divided into three units: Planning, Design and Construction. The Planning Unit has the responsibility for planning and programming all activities of the DGC and employs 53 professionals and technicians. The Design Unit has the responsibility for studies, design and specifications for highway projects. It employs 415 professionals and technicians. The Construction Unit has the responsibility for supervision of all projects, both contract and "force account". It employs 450 professionals and technicians. It has the capacity to supervise both types of construction but will have to expand its organization somewhat to implement the program. A detailed study has been included in Annex E, Exhibit 7. This Exhibit also includes the UNDP proposal for technical assistance on labor intensive construction technique which will be funded by the IDB during 1976.

e. Maintenance Capability

The Dirección General de Caminos Maintenance Department is responsible for the maintenance of all roads in Guatemala except for private roads in coffee and sugar fincas. The maintenance department does construct access roads but only as a minor part of its maintenance activities. The organization is de-centralized, working through eight zone offices (Zonas Viales) throughout the country. (See following organization charts).

The Department carries out a total of some 8,000 Kms. of repair work each year and a small amount of construction work, employing 6,655 professionals, technicians and maintenance personnel. The Eight Regional Offices (Zonas Viales) and their maintenance responsibilities are as follows:

ORGANIGRAMA
DE LA DIVISION DE MANTENIMIENTO

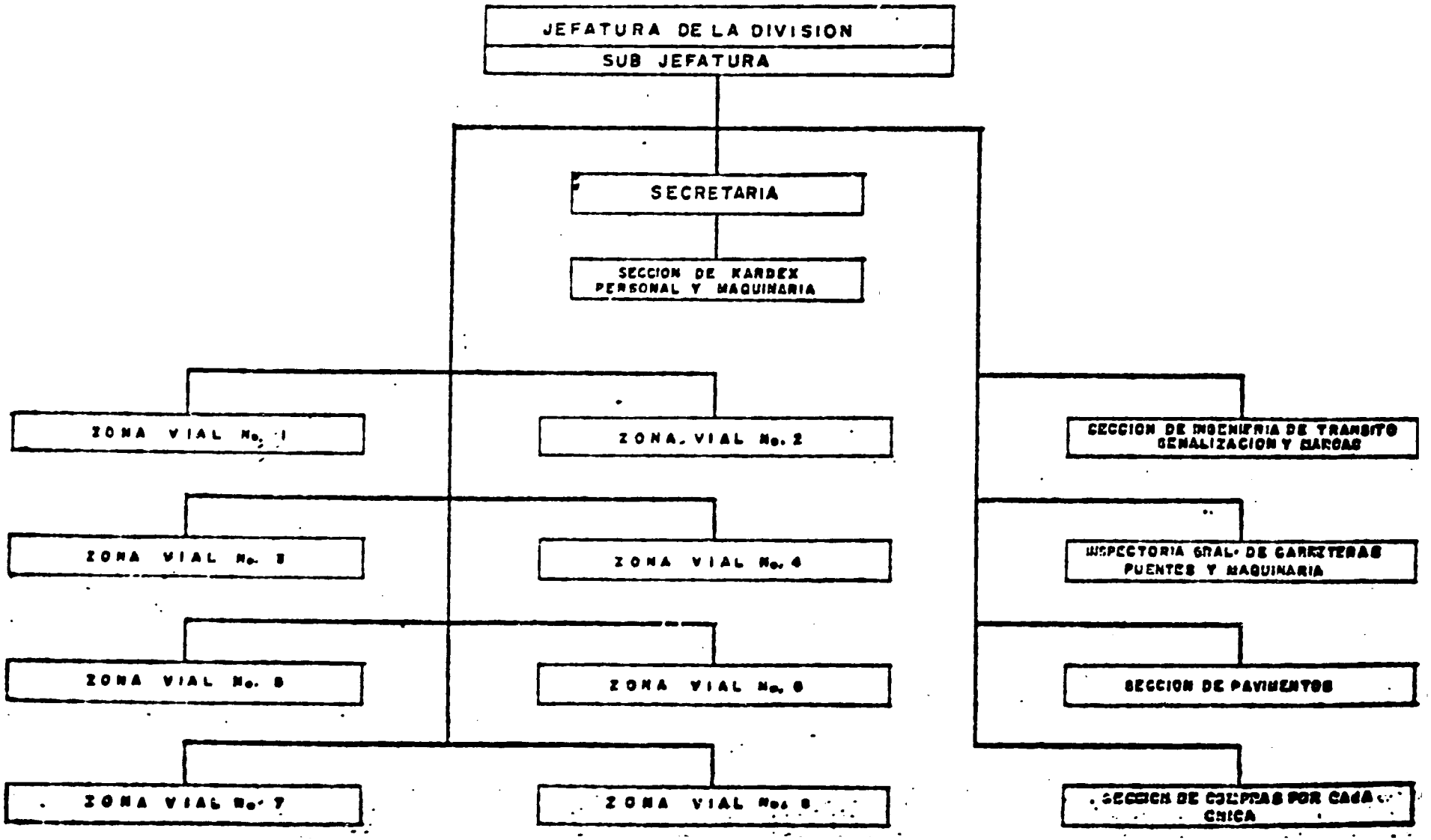


Figure 7 - Organigrama de la Division de Mantenimiento.

ORGANIGRAMA DE UNA ZONA VIAL

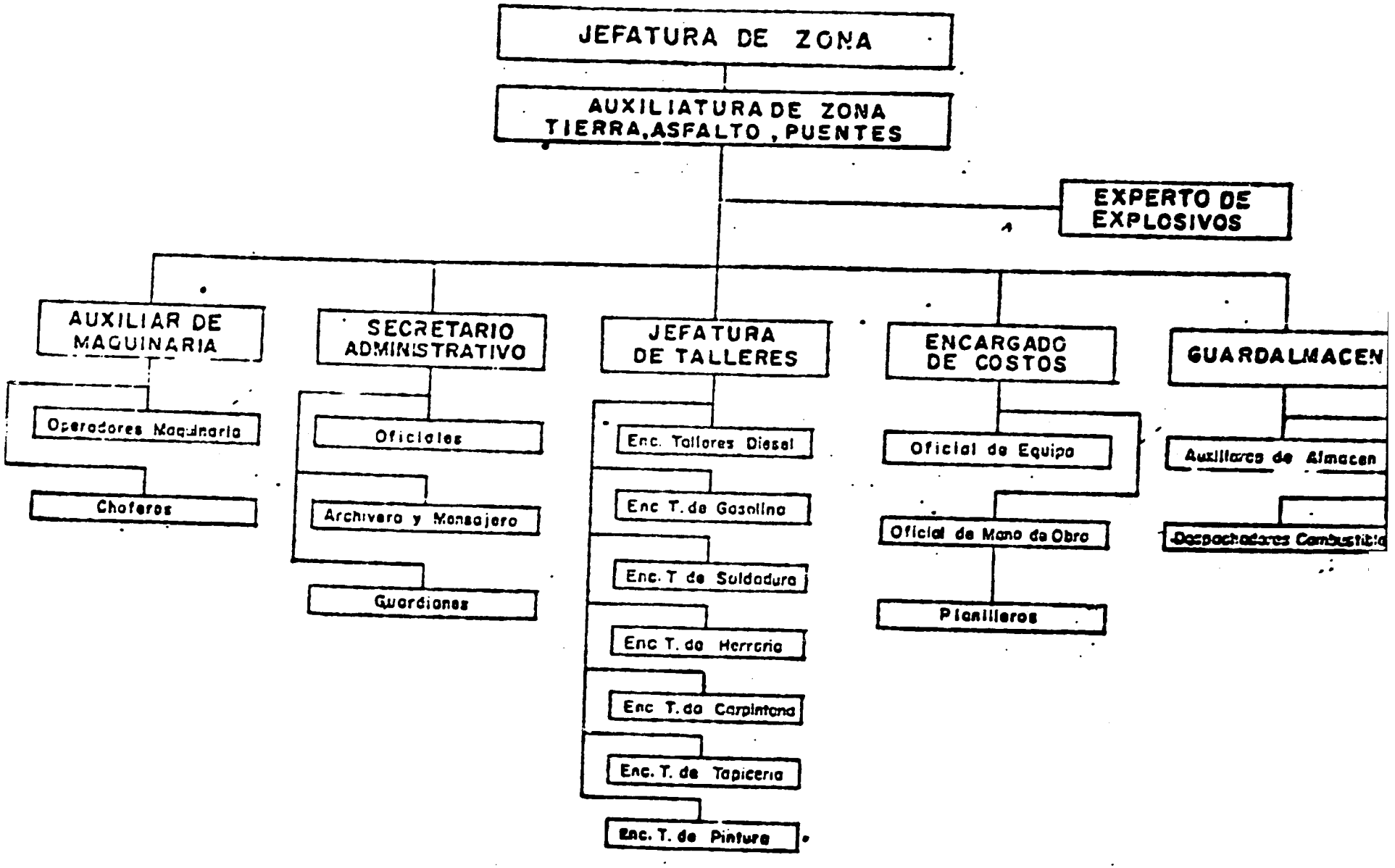


Figura 2 - Organigrama de una Zona Vial

Zone	Headquarters	(1974) Kilometers Maintained	Kms. Not Maint.	Force Account Construction Km New	Force Account Construction Km Upgrading
1	Guatemala	1,668		3.9	
2	Jutiapa	1,057	249		99.0
3	Escuintla	725			
4.	Retalhuleu	1,071	176	6.5	
5	Quezaltenango*	1,164	50	38.1	
6	Huehuetenango*	754	45	76.2	5.9
7	Santa Cruz Verapaz	830	33	33.9	24.5
8	Chiquimula*	789	163	4.2	
	TOTAL	8,058	716	162.8	129.4

*Regional Offices affected by Access Road Program

The above chart shows that the Maintenance Department has not been able to maintain all of the roads presently in the system. The main constraint has been the lack of budget to carry out the work.

Given the increased number of kilometers to maintain due to this program, the total labor requirement would result in the following increased employment profile. Since the total labor required to maintain the additional 280 km. of road is generally hired from nearby countryside or local villages, the unskilled labor would undoubtedly fall within the "target man" category.

UNSKILLED LABOR MAINTENANCE REQUIREMENTS

	1977	1978	1979	1980	1981
Project Kilometers added	10	45	65	75	85
Total Kilometers added (Cumulative)	10	55	120	195	280
Labor Requirements (yrs) at 0.67 man-years/Km.	7	37	80	130	190
New Labor Cost ($) at $132/man-year	1,000	4,800	10,600	17,500	25,200
Cum. Maintenance Cost* for Project Roads	11,000	60,500	132,000	214,500	308,000

*Estimated cost of total maintenance - $1100/Km/yr.

D. Land Resources Improvement

1. Introduction

The increasing population pressure on land resources has forced the exploitation of ever steeper slopes, contributing to erosion which is progressively reducing the productivity of an extremely scarce resource. Denudation of natural forest growth began many years ago and this led to a serious erosion problem. Additionally, while the use of improved seed, fertilizer and cultural practices will contribute to increase productivity, maximum benefit from these inputs in many areas of the highlands cannot be realized unless measures are taken to increase water availability and retention and provide protection against soil erosion.

As pointed out in other sections of this Paper and in the Interim Report, the amount of land in farms in nine highland departments is diminishing while the number of farm families is increasing. Calculations show that in a small area of the Quiché Department, 34 metric tons of top soil are being lost per hectare annually due to sheet and rill erosion. More striking, is the estimate that 534 surface hectares (6" in depth) of top soil are lost annually due to erosion from the 36,000 hectare Xayá-Pixcayá watershed near Guatemala City. Similar problems are encountered throughout the highlands. Although there is general recognition of the problem and corrective actions have been taken by some individuals and by a few villages, there has never been an effective national program to deal with these problems. It is estimated that no more than 10% of highland farms have improvements and practices which adequately cope with the problem. In the Western Highlands where this program will be concentrated, water retention is so poor and runoff so rapid that crops start to suffer from lack of soil moisture shortly after heavy rains. Rapid runoff also carries away heavy loads of top soil as sediment. Some private groups have succeeded in mounting meaningful activities in this respect in two of the highland departments. The farmers have been found to cooperate fully once they understand how to build the structures and observe the resulting benefits. There are many groups organized in the highlands for various and sundry purposes that can contribute to fostering this activity. For this reason, the Mission believes that it is very important to initiate low-cost pilot projects in order to gain experience and develop GOG expertise for undertaking expanded programs in the future.

Agriculture in the highlands is basically dependent on rainfall which has highly unpredictable patterns in Guatemala.

Given wide variance in rainfall patterns and the fact that subsistence farmers cannot afford a crop failure, it is clear that supplementary irrigation has a high potential social and financial payoff. The benefits from supplemental water supplies derive principally from:

a. Eliminating planting time restrictions;

b. Reducing risk of loss due to lack of water at critical periods during the growing season;

c. Increasing yield potentials through use of fertilizers and pesticides; and

d. Enabling the introduction of multiple cropping in many areas.

The major activities required to permit effective use of supplemental water in the highlands are:

a. Construction of diversion canals to introduce proven irrigation techniques;

b. Capture of runoff water to increase total supply through contouring and terracing;

c. Conservation of soils by regulating runoff rates through proper cropping patterns.

During intensive review, a number of regions in the highlands were visited by AID and GOG experts who concluded that potentially beneficial small irrigation and soil conservation projects could be implemented. These would generally benefit areas less than 50 hectares in size and would consist of simple, low-cost designs (rock diversions, earth and rock canal linings, contouring, etc.). Other studies indicated that there is a substantial potential 1/ for increasing small farmer incomes by improving their ability to exploit water resources, especially through making longer growing seasons for diversified crops possible.

1/ J. Baanante, "Profitability Analysis of Some Basic Grains, Vegetables and Fruits in the Guatemalan Highlands"; and see computer print-out utilizing data collected in the 1974 Small Farmer Sample Survey, prepared by R. House, USDA/RSSA.

2. Detailed Project Description

Two pilot programs have been developed to construct small irrigation projects and soil conservation/water retention improvements on small highland farms. Each program will be carried out on approximately 5,000 hectares. Emphasis will be placed on developing GOG competence to replicate the programs throughout the country.

a. Small Scale Irrigation

These sub-projects include the construction of simple infrastructure works using local labor and materials to irrigate primarily agriculture lands under rainy season cultivation.

This addition of water introduces a potential for doubling of incomes on the same land area through producing at least one additional harvest annually. A number of mini-riego systems have been observed which are successful even though system designs and water application are not of high quality.

Based on the observations of an experienced irrigation engineer from Utah State University, working with GOG engineers and agronomists, it has been determined that there are no overriding technical difficulties with the project. A number of potential approaches are feasible for providing irrigation depending on the terrain and water source. In some instances these can be carried out in conjunction with soil conservation and drainage improvements. Examples of potential returns from different types of systems and costs are discussed in detail in Part III and Annex I. Typical projects visited are briefly described below:

- One Farm--Simple Diversion, Gravity Surface System - This example assumes that a farmer is close to sufficient water, which means it is next to or running through his land. Under these conditions, a simple diversion (rocks) system with gravity ditching and complete open furrows would be constructed.

- Community--Simple Diversion, Gravity System - For this example a stream flow, adjacent to or flowing through the land to be irrigated, of two cubic feet per sec. is assumed along with 4" weekly

irrigation with water delivered to each individual plot. A 34 ha. system consisting of a rock and earth diversion dam, gravity canals and open furrows would be constructed.

- Community--Simple Diversion Gravity Pipe System - This alternative assumes flow of two cubic feet/sec. from a stream that can be diverted high up on a steep hill. The system is designed to provide sufficient pressure for sprinklers. For 34 ha., a system would be constructed using an entrance box--settling basin structure, a pipeline and sprinklers.

- Lake and River Community--Pump Irrigation System - Under this assumption two cubic feet/sec. of water (900 gal/min) would be lifted 150 ft. upwards for gravity flow distribution over 34 ha. This more complex system would require a pump, motor, pipe system, sprinklers, installation and annual operating costs.

b. Soil Conservation and Water Retention

This activity will be carried out in close conjunction with irrigation activities, in some cases on the same farms. Structures will consist primarily of contours of several types (furrows and ditches) depending upon slope and depth of soil. Strip cropping will be incorporated on the contours. Brush and rock dams will be erected to reduce the rapidity of water movement in the gulleys and appropriate waterways will be constructed. In certain mountainous areas slopes are so severe that only terracing can provide protection from erosion where the land is cultivated. However, because of the high cost of terracing, it will only be justified in those limited areas where irrigation water is available and high value crops such as onions, garlic and flowers can be grown.

Contour farming can be practiced on steep lands with or without irrigation. Contour furrows will help hold available moisture and decrease erosion. They also help get rid of excessive water with less erosion damage during periods of heavy rainfall. Different kinds of contour farming are used depending on the steepness of the fields, types of crops grown, and methods used to work the land.

Experience by GOG agencies, the Peace Corps and some communities that have undertaken contour building indicates that on a typical site about 30 man days of labor are required to dig 30,000 linear feet of contour furrows. Strip cropping on the contour is used for increased soil retention.

Assuming that on a 45% slope one ha. requires 30,000 feet of furrows requiring 30 man days at $1.50 per man day, the contouring cost would be $45 per hectare. All work will be accomplished with manual labor by the farmers and laborers that they may employ.

Up to approximately $625,000 of loan funds are allocated for small scale irrigation and land improvement projects. See Part III, E. "Financial Plan" for a detailed budget breakdown of project costs.

c. Technical Assistance Program

Technical assistance will be required for implementation of these activities as follows:

- DIGESA will organize two teams who will provide technical assistance for implementation of sub-projects including feasibility studies, organization of farmers, selection, design and building of structures and advising on farm technology.

- Two foreign advisors will be required to assist the GOG technicians with project implementation. They will also help ensure successful evaluation and prepare for expansion into other areas. Specific qualifications and timing are:

  -- Irrigation Engineer (36 mm) with on farm experience in practical application of open irrigation systems.

  -- Soil Conservation Specialist (36 mm) with knowledge of small scale hand labor methods of contouring very steep slopes.

- Participant training for eventual improvement of GOG staff performing these functions will be provided. This will consist of selected B.S. degree

level agriculturists who will be sent for one year training in applied irrigation science, at Utah State, California, Mexico, or equivalent locations. Promoters who work with farmers on the sub-projects will attend in-country short courses in irrigation application. This training will be carried out under the human resources element of the loan.

d. Financing

The project funds for this element will be allocated to BANDESA which will manage it through its Central, Regional and Sub-regional Offices. BANDESA's current terms for medium term lending are 8% for a maximum period of 10 years. Development of the sub-project will be the responsibility of DIGESA technical assistance teams.

e. Implementation Plan

As shown in the following chart, site identification, design, construction and on farm development will be carried on simultaneously. This procedure was chosen in order to strengthen the GOG institutional capacity to identify, study and execute mini-riego and soil conservation activities.

Basically, two mini-riego technical teams will work with the farmers to draw up plans and specifications, and a simple credit agreement. The plans and agreement will be reviewed by the regional chief of DIGESA and presented to BANDESA for approval and disbursement. The teams will organize labor and supervise construction providing any needed technical assistance. DIGESA will strengthen its staff in the project area in order to supervise the project, facilitate the organization of informal water user associations, where desirable, monitor routine operation and maintenance of the irrigation systems and assist with proper irrigation techniques and encourage crop diversification and on farm improvements.

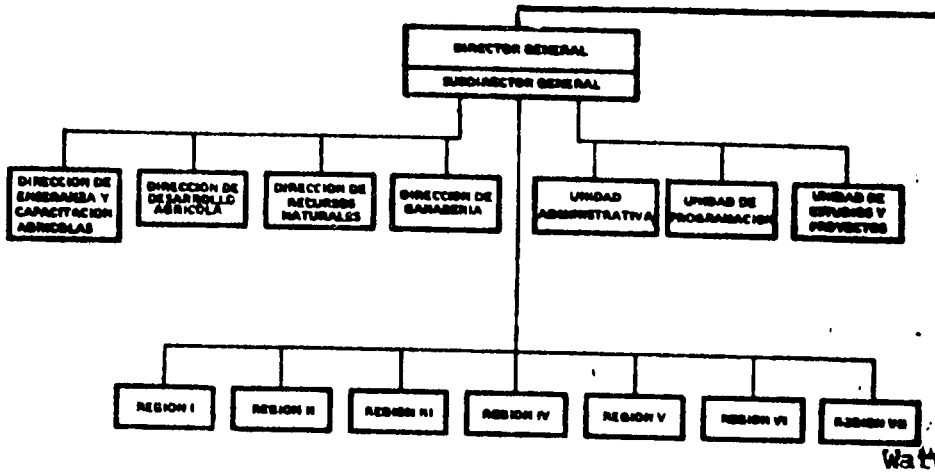
BANDESA will participate as financial agent for the credit fund established for sub-lending to the benefiting farmers.

The project is designed with the objectives of providing the optimum number and level of inputs to complete

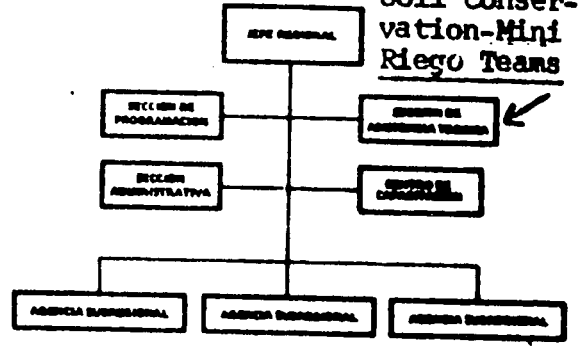
MOA

ORGANIZACION DE DIGESA

La Dirección General de Servicios Agrícolas, está integrada de la siguiente manera:



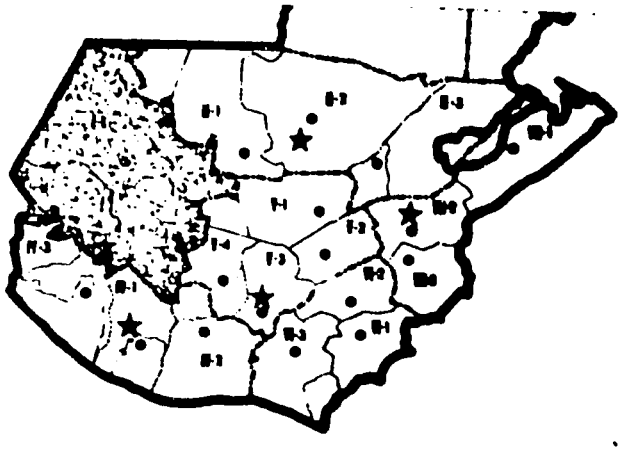
Water Resources Soil Conservation-Mini Riego Teams



ORGANIZACION DE DIGESA

Para la ejecución de sus programas en el campo, DIGESA ha dividido al país en siete marcos operacionales:

Primary Project Area



REFERENCIAS

- Límite Nacional
- Límite Departamental
- Límite Regional
- Límite Subregional
- Sede Regional
- Sede Subregional

up to 5,000 ha. of mini-riego projects and 5,000 ha. of soil conservation/water retention improvements (see chart for quantified time schedule). These inputs will include construction materials and equipment, construction labor costs, staff and equipment for regional teams and technical assistance to DIGESA in project planning and execution.

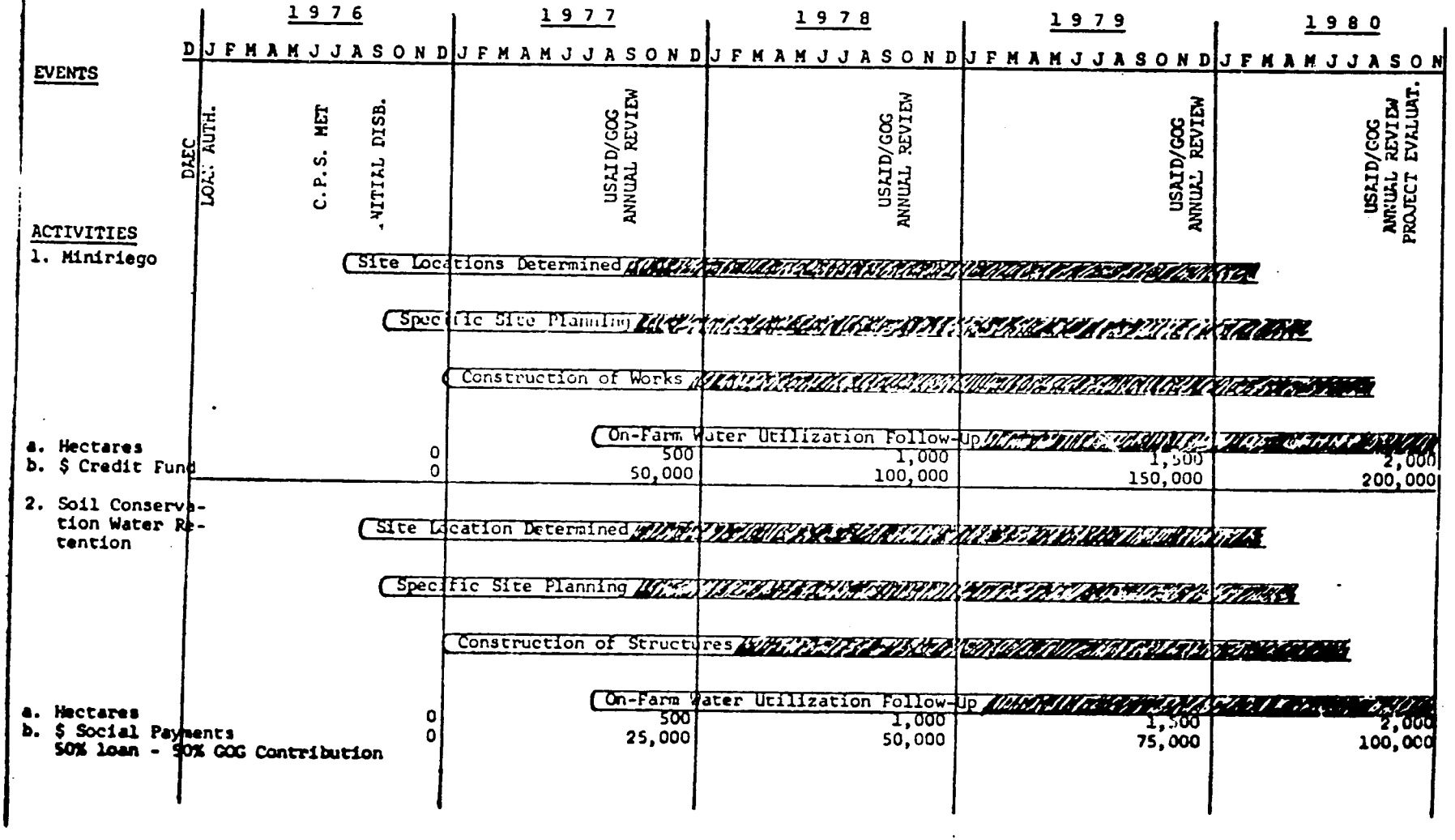
An illustrative example of how a mini-riego sub-project would be organized and executed follows. A potential mini-riego site is located by a coop credit manager or a DIGESA promoter. One of the DIGESA mini-riego teams (agronomist, engineer, topographer) along with the irrigation advisor would make several site visits to:

- Examine the topography.
- Determine required structures.
- Investigate water rights and land tenure.
- Determine potential land use.
- Calculate water quantity and availability.
- Determine social and economic feasibility.

The team would assist the participating farmers in the preparation of credit applications.

The resulting plan will include what is to be done technically and structurally (such as a simple diversion gravity flow pipe irrigation system with terraces) how it will be done (organization of labor/tools materials), and who will do what (schedule man days of work, material location, procurement, transport). The team will determine the costs for mini-riego (irrigation) and terraces and/or contours. This includes cement, pipes, pump, materials, operating capital, fuel and parts to the extent they are required. Upon completion, the plan and loan application will be submitted to the Regional Chief of DIGESA, for presentation to BANDESA for approval. Individual or group credit will be made available on the basis of this application. Credit procedures are established in BANDESA for administering medium term programs of this nature.

ILLUSTRATIVE CHRONOGRAM FOR SUB-PROJECT IMPLEMENTATION



The DIGESA team will supervise construction of the irrigation and soil conservation structure. Simultaneously, it will provide technical assistance to the farmers in systems (water utilization) operations as well as advice on the type of crops that should be grown and the optimum inputs that will maximize production and income.

Special courses will be given with the frequency required by the in-service training program to train extension personnel to appropriately assist farmers in the use of irrigation water.

E. Human Resources Development

1. Introduction

One of the major purposes and achievements of the first GOG five-year Rural Development Plan was to effect a complete reorganization of the Public Agriculture Sector. Legislation was passed in the early 1970's which created the following public sector agencies:

- DIGESA - the Directorate General of Agricultural Services, a line agency of the Ministry of Agriculture, responsible for the programming, execution, control and evaluation of agricultural extension programs, as well as basic public agricultural services such as irrigation, soil conservation and livestock promotion.

- BANDESA - the National Agricultural Development Bank, responsible for promoting and administering production and medium term credit programs, oriented primarily toward the small and medium farmers.

- INDECA - the National Agricultural Marketing Institute, responsible for functions and services related to marketing of agricultural products including application of marketing, price stabilization and consumer supply policies.

- ICTA - the Institute of Agricultural Science and Technology, responsible for the development, field testing and promotion of agricultural technology.

- INAFOR - the National Forestry Institute responsible for public forestry and water-shed management programs.

The Minister of Agriculture was made the "rector" of the Public Agriculture Sector, serving as the Chairman of the Board of the above institutions. To assist him in this role, three organizations were created.

- The Public Agricultural Sector Coordinating Committee, composed of the managers of all of the public sector institutions and responsible for policy formulation and program coordination.

- The Committee for Coordination with the Private Agricultural Sector - composed of public and private agricultural sector representatives, designed to provide a forum for consultation and exchange of information between the public and private sectors.

- The Sector Planning Unit - a staff unit directly under the Minister and responsible for assisting him in the planning, programming and coordination of all public sector activities.

The reorganization was successful to the extent that the institutions for agricultural research, extension, credit, marketing and forestry management are organized, staffed and functioning at reasonable levels of efficiency. 1/

The achievement of coordination among the various agencies within the public sector has been far less successful. The two coordinating committees (public sector and private sector) have met only sporadically and the sector planning unit has not provided the staff support required to assist the Minister of Agriculture in effectively carrying out his policy-making and sector coordination role. The weakness of the sector planning unit to date is attributable to lack of financial and high-level support. Sector planning activities have been assumed through default by the agricultural division of the National Economic Planning Council and programming and budget preparation are done independently by each agency with little direction and/or coordination and only cursory review at the ministerial level. As a result, the activities of the various agencies of the public sector are not integrated, tending to move in their own directions at their own pace. The current Minister and Vice-Ministers are attempting to place some order on these activities but are limited in their abilities to do so by the lack of a strong staff.

There are several other weaknesses which affect sector-wide planning and coordination efforts. Current plans and programs are generally based on data which is either old (the last agricultural census was in 1964), incomplete or of questionable reliability. There are no systematic evaluations of sector activities. Modern

1/ See Annex E "Summary of Evaluation of Prior Assistance" in Supplementary Annex.

programming techniques are virtually non-existent and budgeting procedures are handicapped by the lack of an adequate programming base. In sum, considerable financial, technical and institutional support will be required to provide the Ministry of Agriculture with the staff capacity to plan, program, control and evaluate sector programs.

With the reorganization and accompanying GOG and international donor financing, institutional staffs were greatly increased and public sector programs expanded rapidly. The Ministry of Agriculture budget increased from $12,077,000 in CY 1970 to $24,268,000 proposed for CY 1976. There are presently more than 6,500 full-time employees in the public agriculture sector. While Human Resources Development was a major element of USAID's Rural Development Loan (Loan 018), most of the funds were devoted to farmer training and operating budget support for extension programs, and very little to upgrading the skills of public sector employees.

The educational levels within the Public Agriculture Sector are quite low with only 322 or 5% having academic preparation higher than the secondary level. Past evaluations of sector programs carried out under AID auspices and the Tri-Partite sector assessment point to the critical shortage of sector employees fully equipped with the skills and techniques required to effectively extend Government services to a greater number of the rural poor. This is particularly true for those technicians who have continuous and direct contact with small farmers since no adequate training mechanism exists to insure that the technology that they pass on to the farmers is relevant, up to date, and productivity- and income-optimizing.

Funds were provided under loan 018 for training in selected fields in the U.S. and third countries.1/ ICTA and DIGESA have utilized 37 of the 43 training slots funded under the loan. ICTA has also sent some of its technicians to CIAT in Colombia and CIMMYT in Mexico for training sponsored by other donor agencies.

1/ See Annex E "Participant Training Program under Loan 520-L-018 Background and Procedures", included in the Supplementary Annexes.

From the above it is evident that there is a gap in skills required within the public agricultural sector. To address this problem, a major, integrated program for pre- and in-service training has been included by the GOG in the 5-year Rural Development Plan for 1975/1979.

2. Project Description

This element of the loan will provide support for three major sub-activities to improve the capacity of the public agricultural sector to plan, program and deliver improved technical assistance and other services to the rural poor target group. The three sub-activities are:

- Assistance to establish an expanded Sector Planning and Coordination Office within the Ministry of Agriculture with the capability to:

  o gather, process and analyze data required for policy formulation;

  o program and budget resources in accordance with established priorities;

  o assist the Minister in coordination of all sector programs, and

  o evaluate sector activities in a systematic fashion to provide guidance for future planning and programming.

- Establishment of an integrated, sector-wide pre- and in-servive training program.

- Advanced training in the U.S. and third countries for selected personnel in specialized fields where public sector competence is non-existent or in critical short supply.

a. Sector Planning and Coordination

Loan funds will be provided to support an expanded Sector Planning and Coordination Office for Operations (SPCO) which will be directly responsible to the Vice-Minister of Agriculture. As planned the unit will consist of five divisions: Multi-year Planning, Programming, Budgeting and Project Development, Statistics and Information, Evaluation, and Training Coordination, and will be expected to provide the analytical back up necessary for policy formulation and resource allocation decisions.

The general functions of the staff offices are:

The Division of Economic Analysis and Multi-Year Planning will provide an overall perspective of sectorial trends and requirements, integrating the programs of the various sector institutions in a coordinated medium and long-term strategy. It will estimate investment levels required to achieve sectorial objectives and analyze the impact of alternative policies and budget levels.

The Division of Programming, Budgeting, and Project Development will provide a design capability to help the institutions of the agricultural public sector plan coherent multi-year activities in accord with the integrated medium and long-term sector strategy developed by the Division of Economics Analysis and Multi-year Planning.

The Information and Data Division will provide a means of centralizing the collection, processing, maintenance, and analysis of sectorial statistics and facilitate their use and dissemination.

The Evaluation Division will be responsible for designing the evaluation of all sector programs and assuring that the results of these evaluations are used in subsequent management, program, budgeting and investment decisions.

The Training Coordination Division will coordinate all pre- and in-service training programs within the sector as well as schedule use of existing training facilities; design and procure training materials; acquire, use and maintain audio-visual equipment.

To help the corresponding departments in each of the sector institutions develop the capability to improve the effectiveness of their internal planning and management, the Office will issue guidelines, provide technical assistance, and arrange for international and local training. It will also assign SPCO program analysts to monitor the activities of each agency.

To assist this office in fulfilling its expanded role, grant funds will be provided for 144 man months of long term technical assistance in the fields of agricultural economics, regional planning and analyses, and in programming and budgeting. In addition 60 man months of short-term technical assistance will be financed in the areas of sector planning strategy and development of evaluation methodologies. GOG counterpart and loan funds will finance salaries of key unit personnel. Use of loan funds for this purpose is designed to permit the Office to quickly initiate operations and establish itself as an effective operating unit. Funding for this purpose will be phased out after three years when all salaries will be absorbed within the regular Ministry budget.

Coordination, which is a key element of the SPCO function will be facilitated by the recent creation of a new second vice-ministerial position in the Ministry of Agriculture. His primary responsibility will be supervision of all public sector programs, allowing the Minister and First Vice-Minister to focus on sector-wide policy issues. He has reinstituted regular meetings of the public sector coordinating committee and the Minister in turn, reactivated the moribund Private Sector Advisory Committee - activities which should contribute significantly to improved policy direction for the entire agricultural sector.

b. Pre and In-Service Training for Public Agricultural Sector Personnel

The primary recipients of training will consist of field technicians and their supervisors, some 1,000 of the 6,500 PAS employees. 1/ Less concentrated training will also be provided to research, administrative and management personnel. Instruction for service personnel

1/ See following Tables, Number and Classification of Employees in Public Agricultural Sector Institutions.

Number and Classification of Employees in Sector Institutions

Institution:	Job Classifications 1	2	3	4	5	6	7	8	Sub-total	9*	10*	Total*
BANDESA	20	26	57	0	24	73	206	101	513	87	70	670
DIGESA	22	12	205	102	155	514	97	595	1702	2388		4090
ICTA	2	10	7	83	24	0	41	31	198	70	1	269
INAFOR	14	10	26	12	15	5	26	56	170	120	33	323
INDECA	6	16	31	0	3	44	40	77	217	53	62	332
INTA	8	65	18	0	25	65	39	108	328	237	256	821
Total:	72	145	344	197	246	707	449	968	3128	3377		6505

Key:
1 - Executive
2 - Executive-Administrator
3 - Supervisor
4 - Research Technician
5 - Service Technician
6 - Field Technician
7 - Administrative Personnel
8 - Office Personnel
9 - Skilled Labor
10 - Unskilled Labor

* Estimated

/bb

Classification and Composition of Employees

The size and scope of Sector functions reveal a large number of employees and a wide range of employee classification. For the purpose of this report, employees are classified into the following ten categories. Examples of each classification are provided.

1.	Executives	Minister, Vice Minister, Directors General, Presidents, Managers, Assistant Directors General, Vice Presidents, Assistant Managers, Members of Advisory Councils, Directors, Regional Chiefs.
2.	Executive - Administrators	Chiefs of Divisions, Departments, Sections and Programs
3.	Supervisors	Chiefs, of Subprograms, Chiefs of Projects and Technical Supervisors
4.	Research Technicians	Technicians devoting most of their time to research activity.
5.	Service Technicians	Technicians devoting most of their time to offering technical services (laboratories, controls, and similar support activities).
6.	Field Technicians	Promotors, Extensionists, Credit Agents, Credit Analysts
7.	Administrative Personnel	Auditors, Accountants, Warehouse and Maintenance Foreman.
8.	Office Personnel	Secretaries, Office Help, File Clerks, Receptionists
9.	Skilled Labor	Machine Operators, Foreman, Custodians, Carpenters
10.	Unskilled Labor	Construction Help, Agricultural Day Labor

ACADEMIC PREPARATION OF EMPLOYEES IN AGRICULTURAL PUBLIC SECTOR INSTITUTIONS

	PhD	Master	Bachelor	Secon-dary	Primary	Below Primary	Total
BANDESA	1	0	15	429	225	0	670
DIGESA	0	13	136	1498	191	2252	4090
ICTA	1	13	67	98	82	8	269
INAFOR	0	1	27	127	143	25	323
INDECA	0	1	30	169	132	0	332
INTA	0	0	17	291	513	0	821
TOTAL	2	28	292	2612	1286	2285	6505

will be limited to that required to improve performance in their respective job assignments.

Pre-service training courses will be offered at six months intervals for all new sector personnel between the sub-professional managerial levels. This training will provide a basic orientation to the Sector and will set forth in a clear manner such things as organization of the sector, the respective role of each agency, relative priorities attached to the programs of each agency, geographic locations and regional implications. Additionally, the training will clearly deliniate how, where and in what fashion the trainees' positions fit into the overall sector structure.

In-service training, which is the heart of this activity, will be conducted in the form of short courses, seminars and workshops. It will concentrate on updating technology and the techniques involved in achieving acceptance of new methods at the farm level. Attention will also be given to keeping administrative procedures to a minimum and in finding ways to devote maximum attention to the job of helping the farmers increase their incomes. Contract specialists working under the direction of the National Planning Council have developed an extensive plan to be implemented during the time frame of the 2nd 5-year Rural Development Plan, utilizing funds from this loan and GOG counterpart starting in 1976. The plan anticipates the use of senior, well trained and experienced members of the sector staff to impart knowledge and techniques to those that have had less opportunity. The contracting of supplementary specialized trainers is also contemplated.

Specific courses will emphasize training for field agents and their supervisors in the best available technology that can be transmitted to small farmers that will assist them to optimize net farm income from the total farm operations. These courses will be conducted at the regional level to the maximum extent possible in order to keep it ecologically specific. Priority emphasis will be given to the following types of training:

(1) Recommended practices for the production of basic grains. Course content will consist of selection of land, its preparation and fertilizer re-

quirement; importance of soil testing, how to take a sample and where to send the sample for analysis, interpretation and fertilizer recommendations; kind of seed recommended for planting, where it can be purchased, storage of viable seed on the farm, planting distances and rates; weed control; interplanting with other crops, the kind of crops that can be interplanted and the cycle in plant growth when interplanting should be done; insect control including the recognition of destructive insects and relating them to the appropriate insecticides for their control, the proper storage and use of insecticides and hazards involved when instructions are not followed; plant diseases and their control consisting of distinguishing between those that can be controlled by chemicals and those that cannot and relating chemical control to the symptoms of the plant and timing of application; methods of application of insecticides and fungicides, the kind of equipment required and recommended, its availability and costs; harvesting and protection of the crop including maturity at harvest, drying and conserving; disposal of surplus to family needs including use for animal feed, sale to INDECA at the floor price or to private dealers, prices that should be expected and location of markets where best prices normally prevail and/or the names of persons that normally pay the most realistic prices.

(2) Other courses that will be required with similar course content for the same clientele consist of:

- Vegetable production
- Deciduous fruit production
- Tropical fruit production
- Preserving food on the farm
- Poultry and swine production
- Milk production and the elaboration of milk products
- Soil conservation and water management techniques and their application

In addition to the above courses, special attention will be devoted to training of sector personnel who will be involved in the land settlement and land improvement elements of the loan as well as initial and continuing training programs in instructional techniques, audio-visual equipment use, and educational materials preparation for those public sector employees who will serve as trainers under this program.

Close coordination will be maintained with the training units in each sector institution through continuing direct contact and formal bi-monthly meetings of the Inter-Institutional Training Coordination Committee. The training units in each sector agency will assist the training coordination division in formulating training needs, determining course content, and identifying and facilitating the attendance of participating agency employees at courses. The training division will be responsible for scheduling facilities and obtaining course instructors.

Most of the instructional personnel for the program will come from within the sector to augment this capacity and to obtain specialized skills not available within the sector. Funds will be provided from the loan and GOG counterpart to contract for locally available expertise on a daily or weekly basis.

Training courses will be conducted at the DIGESA Amatitlán Training Center and the six DIGESA regional training centers as well as at ICTA and DIGESA field sites, institutional conference room and other appropriate facilities. Funding is provided under the loan for renovation of Amatitlán Training Center ($15,000), equipment and supplies for the regional training centers ($38,000), equipment and supplies for the training coordination division of the SPCO and the training units of each institution ($64,000) and vehicles for training personnel and transportation of trainees ($94,000). The training coordination division will retain control of the sector training budget and will also establish and operate a central audio-visual equipment pool for use in all sector training programs.

In addition to the loan funds allocated for purchase of vehicles, training materials and equipment and short-term contract funding will be provided for certain project start-up costs. Grant funds will finance one U.S. technician over a three-year period and limited short term technical assistance for developing course content.

c. Professional Scholarship Training Abroad

As can be seen in Table 3 , there are two people trained to the PhD level, 28 to the Masters level and 292 to the Bachelor level out of a total of 3,000 professional and skilled PAS employees. This shortage is particularly apparent in the areas of economic analysis and planning, agricultural technology, statistical analysis, irrigation structures design and management, resources inventory and land use planning, water-shed management, marketing facilities operations and financial analysis and management.

Under Loan 018 some 43 professionals took advantage of the foreign scholarship program with one trained to the PhD level, 11 to the M.S. level, 9 to the B.S. level and 23 received other specialized professional training. 1/ Most of these training opportunities were utilized by ICTA and DIGESA personnel in Agricultural and Animal Sciences.

Despite the training offered under the first 5-year Rural Development Plan there is still a gap between the number and level of professionally qualified people required and those presently available. The second five-year rural development plan includes funds for a major training effort to increase the number and quality of the sector's professional staff. 400 person years of scholarships will be financed at San Carlos University with GOG funds. A combination of loan and GOG funds will be utilized to finance 56 man years of the following types of training which have been tentatively identified as key professional staffing requirements for the sector institutions and the Sector Planning and Coordination Office:

Institution	Type of Training	No. of man/years
ICTA	1 PhD in Plant Genetics	2
	1 PhD in Horticulture	2
	1 M.S. in Horticulture	2
	1 M.S. in Entomology	2

1/ See exhibit 9, "Participant Training Program under Loan 520-L-018; Background and Procedures", in the Supplementary Annex.

Institutions	Type of Training	No. of man/years
DIGESA	1 PhD in Soils Science	2
	2 M.S. in Irrigation Engineering	4
	1 M.S. in Rural Sociology	2
	1 yr. Specialized Study in Watershed Management	1
	1 yr. specialized study in Climatology	1
BANDESA	2 MBA's in Financial Management & Analysis	4
	1 M.S. in Systems Analysis	2
INDECA	1 M.S. in Marketing Economics	2
	1 M.B.A. in Marketing Management	2
	2 yrs. specialized training in storage plant management	2
	2 yrs. specialized training in storage plant operation	2
INAFOR	1 M.S. in Forest Management	2
	1 M.S. in Natural Resources/ Land Use Planning	2
	1 yr. specialized training in aerial photo interpretation	1
INTA	1 yr. specialized training in aerial photo interpretarion	1
SECTOR PLANNING AND COORDINATION OFFICE		
	1 PhD in Agricultural Economics	2
	1 PhD in Statistics	2
	2 M.S. in Agricultural Economics	4

1 M.S. in Statistics	2
1 M.S. in Systems Analysis	2
1 M.S. in Rural Sociology	2
1 yr. specialized training in computer programming	1
1 yr. specialized training in regional analysis techniques	1
1 yr. specialized training in economic research methods	1
1 yr. specialized training in training methods & techniques	1

The various sector institutions will identify personnel for training and forward their proposals to the Inter-Institutional Scholarship Committee which was established by presidential decree in 1972. The scholarship committee will review and approve all proposals before they are submitted to the USAID. The training coordination division of the Sector Planning and Coordination Office will serve as the staff unit for the Scholarship Committee and will assist participants by making necessary arrangements and providing pre-departure orientation.

Periodic reports of participant performance will be reviewed by the training coordination division which will prepare quarterly training status reports for the Vice-Minister for Operations, the Scholarship Committee and the USAID, including recommendations for extension or termination of training. The training coordination division, in conjunction with the Evaluation Division, will also conduct in-depth post-training interviews with returned participants to assess the capabilities of the training institutions, refine course selection and improve their pre-departure orientation and in-training monitoring activities.

The graduate and specialized training will be scheduled for the continental U.S. to the maximum extent possible. Some participants will study in Mexico, Colombia or other Spanish speaking countries. The tentative training schedule detailed above calls for 42 man years of training in the U.S. with the balance in third countries. During the period following loan authorization, the training schedule for the first year will be refined and participants

identified so that training can commence in late 1976 or early 1977. As with all previous participants, new candidates will be required to enter into a contract with their institution which obliges them to work in a designated position upon their return for at least a period of time equivalent to the time spent in training.

F. Technical Assistance for Design and Implementation of the Improved Food Marketing Systems and Market Towns Development Loans

The design and pilot activities leading to the development of the food marketing and market town development loans proposed for FY 1977 funding will require the services of two full-time grant-funded advisors. A marketing specialist will be contracted to advise and assist in the establishment and operation of cooperative marketing systems for the production, collection, grading, transportation, and wholesaling of fresh fruits and vegetables produced by farmers with small land holdings. An agricultural processing specialist will be contracted to work with the cooperative organizations and GOG agencies in establishing arrangements for small holders to market vegetables and fruits to existing commercial processing facilities in-country and to advise on the design of small processing facilities which would be owned and operated by the cooperative organizations.

PART III. PROJECT ANALYSIS

A. Technical Analysis including Environmental Assessment

1. Technical Analysis

A great deal has been covered regarding technical appropriateness and soundness of the activities comprising this project in the respective detailed descriptions in Part II. Also, accompanying annexes go into considerable technical details on some of the activities. Furthermore, GOG agencies have developed extensive documentation of the land settlement, rural roads construction and human resources activities, and the plan for implementing the land resources activity is under preparation.

In addition, work performed by the GOG and USAID staffs over the past nine months in analysis and conceptualization several well qualified consultants and AID/W assistance have been utilized in putting this paper together. These include Ronald Tinnermeier, Francisco Proenza, Robert House, and Thyrele Robertson on USDA, PASAS, Dean Schreiner and Donald Flood of Oklahoma State University, Jorge Baanante, Fred Mann, W.J. Schroeder of Cal Poly University. John Guy Smith of Basico, Bertis Embry of Utah State University, Lee Martin of the University of Minnesota, Mike Demetre of AID/W, David Fledderjohn of ACDI, Donald Mickelwait and David Gow of Development Alternatives, Inc. and Phillip Church of ROCAP. In view of the above, as well as the Government's expressed interest in expanding assistance to the rural poor, its agreement on the poverty index as a key element in the selection criteria for rural roads, and its forthcomingness in taking actions necessary to prepare for the project, we believe the project is appropriate for implementation in Guatemala at this time. In addition, these consultants who have participated in arriving at the estimated project cost consider it to be appropriate for the scope of work envisioned.

a. Technological Implications

The project description clearly demonstrates that technological breakthroughs are not required to implement the activities contemplated. The project relies on practices that have been in use in many countries over the years to expand employment and incorporate the poor into the market place. All of the activities except planning and foreign training elements of the human resources activity can be extended and replicated over vast areas of the country by

The [illegible] profitability for the beneficiaries under each project element has been substantiated to the extent that this is possible in a theoretical context as shown in this document and its annexes. Field checking by knowledgeable technicians indicates the estimates used for these profitability analyses tend to be conservative.

Available crop production technology will be used emphasizing shifts to larger percentages of higher value diversified crops in the irrigation and soil conservation areas, as well as in areas serviced by the new roads. Settlers on the new land will be expected to begin growing perennial crops after two years in the area. Technical recommendations emanating from ICTA research disseminated by DIGESA change agents are expected to stimulate a more rapid switch to the use of improved seeds, efficient use of fertilizer and improved cultural practices as results obtained from field testing are demonstrated to a larger population of farmers. Intensified applications of labor and capital on small farms to increased net income are the principal thrust of project efforts in the densely populated highland area. Farm size, topography and abundance of labor precludes consideration of farm mechanization. Even the use of animal drawn implements is impractical in most cases.

b. Market Demand

- Capacity of Domestic Marketing Infrastructure

Some important changes have occurred in the structure of Guatemala's agricultural markets over the last several years which combine to give the country a greater capacity to handle food products on their way from producer to (domestic or foreign) consumer. Past investment in infrastructure development has given Guatemala a primary road network connecting major production and urban (and export) centers. This road network in 1974 has pulled together into one national market what two decades ago were dozens of small autonomous economic regions. GOG plans to build access roads under the project will be particularly significant in bringing potential markets up to the farm gate of many presently remote and marginal small producers as well as those who will be resettled in new areas.

National capabilities to process and handle foodstuffs have also expanded greatly in the last five years. With CABEI financing, grain storage capacity has increased from 17,000 metric tons before 1970 to 65,000 metric tons by the end of 1975. This capacity is distributed among six regional silo complexes and 21 smaller storage facilities and buying stations

throughout the country. This grain storage network gives the Guatemalan marketing agency, INDECA, wide geographic coverage and enables it to handle a larger percentage of domestic production.

Movement of perishable produce has been aided by the construction of municipal markets in many small rural Guatemalan communities. Some markets were financed with AID "Small Municipalities" loan funds. Presently under design is a new wholesale market complex on the outskirts of Guatemala City in response to the need to handle the growing volume of fresh produce demanded by the capital city as well as neighboring C.A. countries. The USAID is proposing an FY 1977 loan program to develop a marketing mechanism for the target farm population to improve their access to fresh produce markets.

In the private sector, food processing industries have continued to multiply in recent years. Alimentos Kern's de Guatemala, an affiliate of Riviana Foods of Houston, Texas, is processing and canning an estimated 30,000 MT of raw product annually and anticipates a 15% annual increase in tonnage processed over the next three to five years. Hanover Foods, with home offices in Pittsburgh, has installed a major freezing facility near Guatemala City and projects increasing its production from 7,000 MT to 23,000 MT over the next few years. There are several other smaller canning operations in Guatemala City and Quezaltenango which are either in the process of or planning expansion of their existing facilites.

Combined, these physical and tangible changes in agricultural market structures give Guatemala new capacity to handle the injection of additional food commodities forthcoming from the project. Moreover, this capacity is quite broadly distributed throughout most regions of the country--or will be developed where AID production resources are to be focused--promising that larger numbers of the small farmer target population will have access to markets for their output.

- Capacity of Domestic Consumer Demand

The continued growth of the Guatemalan population has put pressures on domestic food supplies. Modest increases in per capita incomes and the relatively higher

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growth rates of urban centers have generated demand for a greater variety, better quality and increased quantity of foodstuffs. Food processing industries demand large amounts and uniform quality of produce supplied on dependable schedules.

The most comprehensive analysis of past trends and future projections of the domestic demand and supply situation for basic agricultural commodities in Guatemala is "Perspectivas para el Desarrollo y la Integración de la Agricultura en Centroamérica", prepared by the FAO. The analysis examined trends in agricultural commodity production increases during the decade of the 1960's and relates these to the growth of domestic demand. Total domestic demand is substracted from total national production to calculate the country's (surplus or deficit) food balance for each commodity. The food balances based on a continuation of past trends, are projected to 1980 to determine the country's agricultural commodity situation if no major agricultural development efforts were undertaken.

FAO agricultural commodity projections suggest a noticeable deterioration in Guatemala's food balance. The country's corn deficit has widened significantly from an average of $0.8 million in the 1968-72 period to $5.7 million in 1973 and $9.8 million in 1974. Projections of past trends reveal that Guatemala has experienced similar deterioration in its bean and rice trade. The projections also reveal that shortfalls in sugar, sorghum, and dairy products will become more frequent as output lags further behind demand. Projecting recent trends into 1980 suggests that Guatemala will require between $15 and $25 million a year in imports of basic food grains to meet its needs with further dietary deterioration. This estimate is conservative because it fails to take into account recent 1973-74 increases in world market prices for these commodities or improvements in Guatemala diets. Increased exchange revenues from expanded cotton, beef and coffee sales may be able to cover the costs of imported food commodities but it still means the diversion of development resources to feed the country's population.

The fresh produce market in Guatemala City and other regional urban centers is expanding rapidly with population growth and increasing incomes. The demand projections prepared by FAO show internal demand for vegetables other than onions, tomatoes, and cabbage increasing by 152% in Guatemala between 1970 and 1990 and by 210% for the rest of Central America during the same period. Equally impressive are the demand projections for "Other Fruits", principally deciduous

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fruits which show an increase in Guatemala from 33,700 MT to 80,560 MT (139%) between 1970 and 1990 and from 121,100 to 331,800 (174%) for the rest of Central America during the same period.

Development efforts will contribute to improving Guatemala's food balance. Guatemala has the land resources to produce grain surpluses by an ample margin. Dairy products and other sources of protein which currently make up only a small share of Guatemalan diets likewise have great production potential, particularly in regions such as the Northern Transversal Strip where pasture is better suited to ecological conditions than grain crop cultivation.

Domestic demand, then, is not a serious long-run constraint on Guatemalan agriculture. On the contrary, the challenge will be that of feeding the country's population at reasonable prices without recourse to greater food imports. If at the same time the goal of improved nutrition of the Guatemalan population is to be met, a still greater effort will be needed to keep production up and prices reasonable so that ample food is obtainable by the low-income consumer.

Higher rural incomes could partly shift farm family consumption patterns away from gains to animal proteins--particularly pork, poultry and dairy products--thus absorbing a large share of marketable surpluses on the farm itself. Some land may also be converted from grains to vegetables for farm family consumption. Nutrition education can be an important factor in changing consumer dietary patterns and as a result influencing the composition of aggregate demand. A demand-led shift to animal-protein food sources where grain-to-meat conversion rates are high would greatly expand domestic market demand for food grains.

- Potential for Foreign Agricultural Exports

The Guatemalan National Development Plan calls not only for increasing production of basic grains and diversified crops to satisfy domestic demand at higher nutrition levels and lower prices, but also proposes generating exportable surpluses as a source of foreign exchange. CNPE assessments have demonstrated that there exist the natural resources, manpower and technology to produce exportable surpluses. Moreover, the Mission feels it is in the best interest of Guatemala to encourage production of basic grains and diversified crops for export as this would strengthen the country's trade position with its Central American neighbors--El Salvador, Honduras, Nicaragua, and Costa Rica.

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Periodic food shortages will be a fact of life in CACM countries for some years into the future. Although its CACM neighbors have also launched ambitious agricultural development programs, Guatemala generally has a better long-run position to produce exportable surpluses particularly temperate climate vegetable and fruit crops because of its natural resource endowments. Whether Guatemala can retain its comparative cost advantage will depend on how quickly it can get new production technologies developed and delivered to its small producers.

With its natural comparative advantage in temperate climate fruits and vegetable production, Guatemala is in an excellent position to capture a large share of the Central American market for these crops if marketing constraints are overcome. Steps in this direction are already evident. In a study of the flow of fruits and vegetables from Guatemala to El Salvador prepared by a consultant for USAID/El Salvador, the volume of fresh fruits and vegetables imported by El Salvador from Guatemala during March 1974 and February 1975 was estimated to be 8,476 MT of potatoes, 5,362 MT of cabbage, 2,496 MT of tomatoes, 9,102 MT of other vegetables and 3,904 MT of fresh fruits (excluding bananas and plantains).

Supply and demand projections for the U.S. and European markets provide general indications of continued, expanding demand for certain fresh and processed Guatemalan fruits and vegetables, particularly those which require great amounts of hand labor in cultivation, harvesting, and processing such as asparagus, cucumbers, and broccoli.

In summary, the Guatemalan internal market is projected to increase substantially, an external regional market exists for any agricultural surpluses Guatemalan can realistically produce and the U.S. and European markets seem capable of absorbing substantial quantities of diversified crops at prices favorable to Guatemala. Moreover, Guatemala can provide a service to its CACM neighbors as a low-cost fruit and vegetable supplier and benefit in return from the resulting increase in reginnal trade. Participation in these benefits, however, will depend on a strong agricultural sector response to domestic and regional market incentives.

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c. GOG Policies, Practices and Regulations

Project activities are consistent with GOG development plans and implementing strategy. Therefore any problems that may arise are expected to be resolved without undue difficulty.

(1) Water Legislation

In order to assure that this activity would not meet with legislative constraints, a GOG lawyer reviewed all legislation related to water use. He determined that the civil code provides the legal basis for the use of water from mountain streams for irrigation purposes and concluded that there are no legal obstacles to implementation. The law provides for free use of water insofar as it does not deprive people downstream of present usage being made of the water. The law also provides for easements that permit movement of water across lands of parties that do not wish to take advantage of water use.

(2) Social cost Payments

It has never been policy of the GOG to subsidize the cost of land improvements carried out on private farms. However, they share USAID's views that such incentives are feasible to provide in order to motivate farmers to conserve soil resources. The GOG is studying the issue of authorizing such payments, but has not yet made a decision to proceed.

(3) Life of Project

Life of project is planned for five years from date of authorization. To facilitate rapid start-up of implementation, the Mission requests authority to reimburse the GOG for use of project equipment procured from excess property stocks (principally construction equipment for the access roads sub-project) which may become available after loan signing but before conditions precedent are met.

(4) Staffing

As outlined in the Human Resources section of the project description, lack of trained manpower is a serious constraint in the public agriculture institutions.

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This places a real limitation on the ability of the GOG to undertake large expansions of responsibilities because its budgetary process and the complexity of civil service regulations affecting the hiring process mitigate against large increases in public agency staff over short periods of time. It has been USAID's experience that the Government has been forthcoming in assuming salary costs once an activity has been initiated.

A case in point is the GOG's assumption of full costs for 250 ag extension agents initially supported by AID 018 loan funds.

d. Environmental Assessment

Many of the adverse environmental practices in the rural Guatemala villages are the direct result of the villagers' socio-cultural limitations, the pressures of subsistence economics and the absence of village management of its natural resources. The combination of excessive population increases and relatively little net out-migration has forced most of the villagers to remain at subsistence levels and satisfy their increasing needs through expansions into more marginal hill-side swidden agriculture. Because of the broken topography, soil characteristics and rainfall intensities, the present agricultural practices are inflicting serious damage on the village watersheds and causing significant losses in soil fertility through leaching and erosion.

The project has been reviewed for its possible environmental impact and no adverse effects are foreseen as resulting from its implementation. The project should contribute towards the realization of several positive changes to the natural environment, especially in the areas of land conservation and use of agricultural resources.

Since the four project elements have differing environmental implications, they are treated separately below.

- Settlement of New Lands

Transforming undeveloped forest lands into cultivated farmsteads cannot be accomplished without affecting the natural environment to some degree. In the Northern Transversal Strip, there are natural hazards that must be taken

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into consideration prior to assigning land for settlement. These hazards include high rainfall intensities, a hot, humid climate, undulating terrain intermingled with hills and steep slopes and exposed karsistic geological formations. Combating these elemants that lead to environmental damage will be an important aspect of land use planning, design and execution. Technical assistance will be provided to insure that care will be exercised in identifying areas of concern and taking measures to minimize the impact of operations. Soil characteristics and capacity to support crops and/or vegetation of economic importance has been or will be determined prior to release of homesteads for settlement. Land with excessive slopes or delicate soils suited only for hardwood tropical forests will be left in its natural state and managed by the cooperatives. Selective cutting of timber will be practiced on the areas in permanent forest. Those lands suitable for crop production will be cleared and planted to crops adapted to soil and climatic conditions. Controlled burning will be required to facilitate initial clearing and thereafter measures will be taken to reduce the practice. In addition, minimum tillage cultural practices, consisting of planting corn and rice without the soil being disturbed, will be encouraged during the first two or three years of land use. Land unsuitable for supporting annual cultivation will then be rotated into perennial crops (i.e., adapted pasture grasses, pigeon peas, sugarcane, cardamom, citrus and other similar crops) that will provide adequate protection of the soil resources. Basic grain crops (corn, beans, etc.) will continue to be grown on small areas of the individual farms on a rotation basis for family consumption. The production teams provided by the GOG and cooperative technical personnel will teach farmer the proper methods of controlling and managing runoff on the farmsteads and the implementation of drainage practices necessary to prevent soil movement.

- Road Construction

The proposed access road projects will be limited to minimum design standards and specifications because the projected traffic levels will be light for the near future. Therefore, disturbance to the surface area where they are to be constructed will be minimized and adverse effects on the environment reduced accordingly. Nevertheless, a few of the roads will be constructed in heavy terrain where

appreciable quantities of earthwork will be excavated for short sections. The accumulation of runoff caused by such altering of natural surface configurations will be controlled by structures appropriate for preventing soil movement. The proposed labor intensive method of construction reduces major changes in natural drainage courses, considerably alleviating problems of erosion. Tile, culverts and low water bridges will be used for cross drainage. A wearing surface of appropriate material will be maintained and, coupled with longitudinal drainage, will prevent the road from being badly eroded or destroyed during the wet weather. Given the location, design and construction practices to be employed, there are reasonable assurances that damage to the environment will be minimized as a result of this project activity.

- Land Resources Improvement

Environmental protection and its resulting contributions to improving soil productivity and increased yields is the objective of the land resources improvement activities. The mini-irrigation projects will concentrate on diverting water from small mountain streams in sufficient quantities to irrigate adjacent parcels of land. The contour field ditches, in addition to carrying irrigation water during the dry season will help reduce water movement during the rainy season and contribute to soil stability. The teams of technicians designing and supervising construction will be trained in the techniques of environmental protection and will be assisted in their work by U.S. irrigation and soil conservation technicians with considerable experience in implementing such activities. Preliminary reconnaissance of the watersheds will be made prior to the design of a system to assure that no one will de deprived of present levels of water usage.

The soil conservation element of the project will contribute to improving local watershed management in all of its aspects. This activity envisions the construction of surface improvements by labor intensive methods to increase water retention on arable land and reduce runoff in the highlands. Contour ditches, terraces and simple drainage swale structures will be constructed to reduce water movement. As in the small scale irrigation element, field

teams will be trained to design soil retention and drainage structures that are beneficial to the overall watershed environment, and they will teach the farmers how to erect and maintain them. This activity should have a positive effect upon the environment by reducing the extensive damage now being done in the Highlands.

(e) Human Resources Development

This activity is indirectly related to environment protection but can be of considerable influence since one of its major activities has to do with improving the competence of sector personnel to assist farmers in improving cultural practices and farm management. To the extent the small farmers increase their productivity to viable levels, they will be in a position to improve themselves and their land and water resources and can then break away from traditional farming practices that damage the environment.

This training program will provide a forum for the orientation of the above mentioned technical teams and other sector personnel about environmental protection and awareness and will impress upon them the need for carrying out their activities in such a way that the balance of nature will be maintained.

B. SOCIAL SOUNDNESS ANALYSIS

1. SOCIO-CULTURAL FEASIBILITY

a. In this project there are three distinct, but closely related components: labor-intensive road construction, water resources and soil conservation, and new lands colonization. All three are directed towards improving the quality of life and increasing the incomes of rural Guatemalans - particularly those Indian peasant families living at subsistence level, be they minifundistas or landless laborers. In the Western Highlands, where the target population lives, small farmers are becoming steadily poorer as a result of population growth, land fragmentation, and land erosion. In order to maintain themselves at even a bare subsistence level, many peasants, often accompanied by their families, are obliged to migrate temporarily to work on the coastal coffee and cotton plantations. This work is universally disliked, not only because of the cultural and physical adaptation involved, but also because it means working for a ladino patrón. Family income may also be supplemented by some craft industry or by working as an itinerant merchant or trader.

In rural Guatemala the Indian peasants (naturales or indígenas) occupy the bottom rung of the socio-economic ladder. As in other countries with a large indigenous population, for example Peru, the peasants are discriminated against socially, economically, politically, and their culture in general denigrated by the dominant ladinos. The distinctions between these two groups, of Indian peasants and ladinos, are based on cultural and economic rather than racial criteria. A peasant is someone who wears traditional dress, speaks an indigenous language, has his own system of beliefs and customs about man and his place in the universe, and is predominantly a small plot agriculturalist. A ladino is someone who wears western dress, speaks Spanish fluently, whose belief system is a fusion of Latin Catholicism and western individualism, and

who engages in commerce or practises one of the professions, either privately or as a government employee.

Within the highlands, however, the peasants are in the majority and many are minifundistas which means that they have a certain control over their lives. Within their communities or aldeas they have their own political authorities (the alcaldía indígena) as well as their own magico-religious experts. As in many other agrarian societies the village elders (the principales) also have considerable power.(1) Seasonal migration to the coast, unpopular as it is, helps the peasants to preserve their way of life in the highlands, albeit often at barely subsistence level.

Given the existing social system which is characterized by peasant distrust and suspicion of ladino bureaucrats and technicians, any project which attempts to help the peasants must gain their confidence by consulting and involving them from the very beginning. Projects in Guatemala which have done this, for example the World Neighbors program in San Martín Jilotepeque and that of the Centro Campesinal-Agrícola Choquí outside Quezaltenango (funded by the Canadian government), have shown that the peasants are quite capable of introducing, accepting and implementing innovations when these are explained to them by their own people in their own language. Such an approach calls for a great deal of patience and dedication from those responsible for running the project. It also calls for continuous interaction with the peasants to understand their needs and problems and insure that the project is actually helping to solve them.

b. Perception of Changes

1. Market Accessibility: Labor intensive road construction is designed to facilitate the marketing of agricultural products, particularly citrus fruits and vegetables, as well as in-

(1) Communication of Agricultural Information in the Guatemalan Occidente, by Robert M. Carmack, SUNY Albany, 1974, p.4.

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crease peasant income in the most densely populated areas of the Highlands. In a new lands colonization program adjacent to the area selected for settlement (the Ixcán project), the major complaint of the settlers was the lack of a road which made it almost impossible for them to market bulky products like corn. In the area of San Martín Jilotepeque 500 peasants had signed a petition demanding an all-weather road in return for some collaboration on their part - a petition which, local leaders say, the government is going to implement. The peasant population is well aware that without market access they are limited to subsistence agriculture. This portion of the project will be well received and appreciated by the target population.

2. Soil Conservation and Irrigation: Soil erosion has become a national problem. In the highlands around Quetzaltenango a hectare of milpa (the land on which corn is grown) on a slope of 15 per cent will lose approximately 41 tons of topsoil annually through runoff. Peasant perception of the importance of soil conservation is shown by the number of peasants who take courses at the Centro Campesinal-Agrícola Chiquí, around 5,000 annually, and the acceptance of soil conservation techniques in Chimaltenango introduced by the World Neighbors program: up to 90 per cent around San Martín and up to 50 per cent in the surrounding municipios. When questioned as to why they do not practise conservation, peasants in Todos Santos, an area of heavy seasonal outmigration, claimed that they did not have the time. The people there, however, also rear sheep and are not totally dependent on agriculture. In Ixcán the people said they were too busy to bother with soil conservation. With so much land available, they have been practising what is little more than slash-and-burn agriculture which can have disastrous ecological implications in an area that may receive up to 250 inches of rainfall a year and where much of the cultivation is carried out on steep hillsides.

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Irrigation schemes, both small and large, have been implemented in various parts of the Western Highlands. When peasants have seen how it can be done, they are willing to try it for themselves. However, in some cases they simply do not know how to irrigate. In some areas peasants expend a lot of time and energy in a fruitless form of splash irrigation, which provides so little water that the roots of the plants never extend down to tap the moisture of the soil but stay on top awaiting for the next inadequate splashing. In other areas they use the town effluent to irrigate their orchards - a practice which is ecologically beneficial. If the peasant has to be paid for digging irrigation ditches or canals for his own milpa, this indicates that there is something basically wrong with the project and that the small farmer does not perceive it as a benefit. A successful irrigation scheme will make possible two or more harvests a year, a benefit universally recognized by even the most remote and isolated peasant.

3. Colonization: Colonization in the tropical rain forest (tierra caliente) is perceived by those peasants who have visited the area as a viable alternative for those who have little or no land. If there is sufficient land to live on (from their perspective, i.e. more than one hectare), then life in the highlands is usually preferred. People in areas which have not sent settlers to the tierra caliente are not fully convinced of the viability of colonization. It means a big break with their accustomed way of life. Seasonal migration, although disliked is toleranted because it is a world which the peasants already know - a world which provides them with the necessary cash income to continue living in the Highlands. The success of the Ixcán project in attracting new settlers has been due to two factors. First, it was organized by the Maryknoll Fathers who had been working in the Highlands for many years and had gained the respect and confidence of the people. Second, a large number of peasants had so very little in the form of either land or resources that the opportunity presented by the colonization project

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provided a strong motivation to migrate. Many settlers first visited the area to see for themselves what life there was like before deciding to start a new life there with their whole family.

C. Cultural Demands of Changes

If the project is to succeed, then it must take peasant beliefs and customs into consideration. For example, in the peasant cosmology of many highland areas both the earth and its most important product, corn, are sacred.(1) Some people in the vicinity of San Martin have refused to do anything about soil conservation on the grounds that only God can make the changes. Such attitudes can be changed by reference to the past. At the Centro Campesinal-Agrícola Choquí peasants are shown photographs of the terracing at Zaculeu, outside Huehuetenango, executed by their ancestors. For improved corn cultivation practices, people are shown photographs of corn cobs found in Mexico dating back to 1500 B.C., contrasted with the small cobs produced on their present milpas, and compared favorably with what the experimental station can produce as a result of terracing, contour farming, and the use of organic fertilizers (aboneras). It may well be possible to do the same for irrigation.

Colonization calls for the greatest cultural changes since, in many ways, settler society is a new society-though not a rootless one- as many families preserve their ties with the Highlands. Traditional agricultural techniques have been grafted on to a form of slash-and-burn agriculture with potentially disastrous consequences for the ecology of the area. In the colonization component of this project, particular emphasis must be placed on organic fertilizer, crop rotation, crop diversification, sowing of pastures, and soil conservation from the very beginning.

1 Carmack, op. cit. pps. 19-22

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The cultural changes involved include the necessity and inevitability of cooperation among the different ethnic groups involved in the project. While these groups are often antagonistic in the Highlands, the experience of Ixcán has demonstrated that this has not been a problem. Cooperation has been accomplished by encouraging the settlers, generally those with the same ethnic background, to form groups of twenty. Different groups from varied background work together in community projects and in the local cooperative. All the settler families have received help from relatives and neighbors during their six-month trial period. Once the new family is established, it in turn is expected to help other new arrivals.

The major cultural change involved - at which all the components of the project are directed - is increasing peasant production and peasant income. To do this will require improved systems of marketing. Because the peasant produces more does not mean he will sell more. First, it will mean that he and his family will eat more - as in Ixcán. Second, some of the surplus will be expended in reciprocal distribution within the extended family (1). How much he or his wife sells will depend very much on both what they have to sell and how the marketing mechanisms facilitate the sale and guarantee them a reasonable return for their work and investment.

D. Motivation

Peasants are perfectly aware of the problems they face in agriculture and are receptive to suggestions about new techniques if they are presented in an appropriate way. The importance of accompanying any presentation of some new technique with a practical demonstration of what is involved cannot be

(1) Carmack, op. cit., p.17

overemphasized. This is just as true for colonization as it is for soil conservation. Once people see and understand a demonstration, they can appreciate what is involved. They will then be ready to try new techniques and methods if they are within their resource capability. In some cases the motivation toward change must overcome social and cultural barriers and new ideas may take a long time to surface. Patience on the part of those introducing the innovations will be of cardinal importance.

E. Project Beneficiaries

The beneficiaries of the soil conservation and irrigation projects will be minifundistas who are willing to try these new techniques, and who are initially aided by the assistance teams funded under this project. The primary beneficiaries of the colonization project will also be minifundistas; landless laborers will also be included.

Because colonization requires uprooting from traditional Indian society, something which is made acceptable only by poverty and lack of opportunity, no special restrictions are necessary to insure that only small farmers benefit. The only criteria for acceptance as a potential settler should be health, age, married status (legal or common law) and financial status. The unit of colonization will be the family since a lone settler simply cannot make it on his own. The first three criteria can be measured objectively, the fourth can easily be determined by the other settlers - as in Ixcán. His willingness and ability to work the land will be demonstrated during a six-month trial period, a recommended screening device for new settlers.

Those families which have abandoned the Ixcán project can be categorized as follows:

1. Those unused to working and managing their own land, e.g., landless laborers. As the project is

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designed specifically to help such people, every effort must be made, through brief courses and technical advice, to make sure this problem does not continue in the new lands project.

2. Those unused to hard, continuous physical labor, e.g., itinerant peasant traders, whom land scarcity has obliged to engage in such pursuits on a semi-permanent basis. Only time will tell whether such people are capable of making the physical adaption necessary for leading the life of a settler. A six-month trial period should provide a reasonable indicator of this capacity.

3. Those who contact some illness, often skin deseases in the hot, wet climate, which may necessitate their return to a higher altitude. This problem can be ameliorated by a careful medical examination before migrating and the availability of health care from the very beginning of the project.

4. Those who come from closely-knit communities and who may be forced to return for personal reasons, e.g., the death of a parent. This is a problem which cannot easily be resolved. The fact that a potential settler family comes from such a community or area should certainly not be grounds for exclusion from the project. It may be precisely such people, with plenty of experience of cooperation and reciprocity, that the project needs.

Ladinos and intermediarios (middlemen) will not benefit directly from any of these components - at least not in the initial strages of implementation. However, over time they most certainly will if peasant production and market participation increase.

F. Obstacles

The principal obstacle to implementation of this project is the "benign neglect" shown by the government towards

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its peasant population. When the government has acted on their behalf, it has invariably done so through ladino professionals and technicians who have little knowledge of subsistence agriculture. The peasants complain that such people look down on them and that the advice given is far too abstract and theoretical for them to grasp. Experience from other non-governmental projects in Guatemala has shown that dedicated, highly-motivated leadership in the first years of a project, together with close consultation and involvement of the peasants from the very beginning, can have encouraging effects over time if the information to be passed on at the grassroots level is provided by peasant promotores or guías. Peasants will also respond readily to those who demonstrate that they know what they are talking about, be they peasants or ladinos.

As the project is directed towards increasing peasant production and market participation, marketing facilities must be provided, either through existing cooperatives or some new organization, which will ensure the peasant producer a fair return for adopting these innovations. Without these mechanisms, the returns to increased production will be captured by non-peasant middlemen.

G. Communications Strategies

At the grassroots level peasant promotores or guías, fluent in the respective indigenous languages, should be the principal medium of communication in the Highlands. Research in one area of the Highlands found a general functional vocabulary in Spanish of approximately 90 words. In the colonization project, with a mixture of Indian languages, Spanish will be the language of communication. On a more general level, radio can be an effective medium if adapted to meet the peasant's needs and understanding, e.g., a dialogue in the indigenous language between an older and a younger man with cackling chickens and marimba music in the background.(1)

(1) There is an ongoing experiment utilizing radio as an agricultural extension medium in Guatemala. See the progress reports of the Basic Village Education Project.

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However, the importance of practically demonstrating the innovations is crucial. Radio programs or informal talks will be useless unless followed by practical demonstration. Itinerant peasant merchants could be used for spreading some of the information - advertizing some course or the availability of some improved variety of seed.

II. SPREAD EFFECTS AND DIFFUSION OF INNOVATION

A. Attempt to Establish the Process for Learning and the Adoption of Innovation

In order to do this it will be necessary to have an evaluation system which will attempt to determine who does and who does not adopt, why people adopt, where they hear about the innovations, what effect adoption has not only on their production and income but also on their behavior and way of life in general. In order to measure these processes longitudinal data are required: data collected at the beginning of the project and then throughout the life of the project at regular intervals -- not only from those peasants directly benefiting from the program but also from a matching control group of those not directly benefited.

The only feasible way to collect these data will be through the peasant guías or promotores who are working directly with the peasants at the grass-roots level. With the people's confidence he/she will be able to explain the rationale for preparing farm records, talking informally or in groups with project staff about constraints to change, or administering a short questionnaire at periodic intervals. Without a matching control group it will be impossible to establish, with any certainty, linkages between the application of external assistance and the adoption of more rewarding agricultural techniques. (1)

(1) See the Evaluation Plan for further detail on the system recommended for implementation in this project.

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B. Leadership and Organization

For the soil conservation, and irrigation projects it should be possible to work through the cooperatives where they exist. The success of the colonization project depends on some form of cooperative organization. In cases where no such organizations exist, it may be possible to work through the existing indigenous leadership in the alcaldía indígena. Failing that, it may be necessary to create a new group formed from a nucleus of those most interested in implementing innovations. Some opposition may be encountered from the village elders (principales). However, if the promotor/guía is himself a peasant then half the battle is won.

III. SOCIAL CONSEQUENCES AND BENEFIT INCIDENCE

A. Access to Resources and Opportunities

The principal resources affected by the project are, first, land, and second, water; credit and marketing are important corollaries. The effect that this project has on the distribution of income will depend largely on the extent to which these resources directly benefit the small farmer. Increased production does not necessarily lead to increased income and may, in fact, benefit the urban centers more through the availability of cheaper food.

The opportunity offered by this project is fundamentally that of increasing agricultural production of peasants and, hopefully, their income. The road construction component of this project is designed to facilitate the marketing of products, as well as providing temporary income generation for laborers. Any increases achieved will be shortlived unless something is done about the rapidly increasing population. A family in the colonization project with ten hectares should be able to live reasonably well after four to five years of hard work. But their children, perhaps up to ten in number, may well divide up the land once they reach adulthood. A third generation will

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begin to turn the newly colonized land into miniscule holdings - the factor which prompted people to migrate from the Highlands in the first place.

With irrigation schemes care must be taken to determine that such projects do not simply benefit those who are least in need of assistance. This requires ascertaining who has access to the water and who controls the water rights --individuals or the community as a whole. Customary practices of water use, in both the dry and wet season, must also be investigated to insure that sufficient flow is available after extraction of that needed for irrigation. As with any irrigation project, the "downstream" research must be conducted to see that there is always a sufficient flow of water to satisfy everyday family needs -- washing, cooking, drinking, etc.

The amount of land made available for sale in the Highlands will, in all probability, be very small. As the project is designed to assist those with little or no land, even if all their land - either owned or rented - were made available it would still be a very small amount. (Less than one hectare per family). In Ixcán many of the families still maintain their small parcels in the Highlands, a practice which is also found among Highlands settlers in colonization projects in Peru and Bolivia. However, some settlers do sell their land in order to have sufficient cash to reach the project and to support themselves during the first six months.

B. Employment and Migration

The greatest impact on employment and migration will come from the irrigation and colonization components of this project. With irrigation, small farmers will be able to grow two or more crops a year -- one of which may well be a cash crop such as vegetables. With year round work, this should reduce the need of small farmers to migrate to the coast in order to supplement their income. Colonizations will require

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full-time year-round work for the families involved. All the components of the project will create temporary employment opportunities, but the main impact will be to reduce the seasonal migration to the coast.

C. The Role of Women

The impact of the various components of this program on peasant women could be significant. The following are some tentative hypotheses:

1. As a result of the road construction program, access to markets and urban centers will be facilitated. Not only will this enable women to market the families' products more easily, but it should also allow them the opportunity to use the facilities available in urban centers -- such as health and educational services.

2. Better transportation may encourage more parents in the Highlands to send their children, particularly the girls, to school. Education is often seen by the peasants as a vehicle for social mobility. More importantly, a good working knowledge of Spanish would help the children to continue the changes initiated by their parents - particularly if crop diversification and improved marketing systems are introduced. But horticulture and marketing are often primarily female concerns. In the colonization project the schools have a vital role to play in the teaching of Spanish, not only for the above reasons, but also because Spanish will be the lengua franca of the various ethnic groups.

3. In the irrigation and colonization programs, women will play an important role in production. When crops diversification occurs, say in the cultivation of vegetables and some perennials such as coffee and cardamom, these are usually the responsibility of women. In the colonization program some emphasis will be placed on the rearing of livestock -- an activity usually managed by the women.

4. If the innovations in the Highlands succeed over time, then the necessity for seasonal migration and the accompanying social dislocations and detrimental effects upon family life will be reduced.

5. In the Highlands, and particularly in the colonization program, if agricultural production is increased and diversified, the women will be able to provide their families with a more plentiful and varied diet -- a factor of great importance in the children's early years if they are ever to stand a chance of developing their full potential.

6. But it is the colonization project which offers the greatest opportunity for developing the potential of women since it will be, quite literally, a new society. Women should be permitted and encouraged to participate in various community organizations. As cultivation of non-traditional crops may well be the responsibility of women, every effort should be made to include them in demonstration and training courses. This also holds for livestock production. Efforts should be made to hire female extension agents and promotores/guías if some inability exists. The limiting factor is the time-consuming responsibility of caring for a large family. If the women are to become more integrated into the productive process, without the benefit of the extended family to provide child-rearing services, then the crops they cultivate must be situated near the home.

D. Changes in Power and Participation

Little change is envisioned in existing power relationships unless the peasants are given some say and participation in the decisions made affecting their lives. Without this participation the project will have little impact as the peasants will interpret it as yet another ladino "solution" to their problems. What is needed is ladino assistance to help the peasants solve their problems in their own way. If the innovations succeed in the Highlands and the peasants produce a

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marketable surplus, then their economic power will be increased. But this economic power can be very easily dissipated unless it is anchored in some organization, e. g., a farmers' association, a cooperative, etc.

The colonization project offers the greatest potential for changes in power and participation. It is a new society that will be formed and settler participation will be a necessity from the very beginning if the program is to succeed. The creation of the necessary infrastructure, the creation of small urban centers and markets within the project, the selection of and assistance for new families - all these activities demand participation and cooperation. If the project is implemented following the experiences of the Ixcán program regarding size of land parcels so that each family has the same amount of land and is prohibited from selling any part of it, then the basis for a relatively egalitarian society will be established. This is not to say that power relationships will not develop within the project. They most certainly will but, given the security of land tenure by each settler family, the potential for assymetrical power relationships is severely restricted. Marketing offers another potential area for the development of such assymetrical relationships but, if this is handled through a cooperative in which all settlers participate then, once again, the problem will not be severe.

The Ixcán project has shown that settlers are quite capable of living and working together amicably once they are given the opportunity. One of the remarkable aspects of the project is the degree to which the different etchnic groups have been able to cooperate. But this, as with other components of the project, takes time, allowing local leadership to gain experience and confidence in their own capabilities. The opportunities for social benefit to a disadvantaged population are clearly evident through each component of the project as designed. It is the implementation that will provide the testing ground. Utilizing the local peasants and local peasant organizations from the first stages of project initiation is the single best guide for insuring that productive assets, income and power shift to the disadvantaged as planned.

C. Economic Analyses

1. The Agricultural Sector*

The agricultural sector of Guatemala accounts for about 28% of the Gross Domestic Product and has held this share, in constant prices, for the past several years. Agricultural exports earn more than $300 million annually in foreign exchange.

Approximately two thirds of the total population in Guatemala live in rural areas. Of the rural population, about 55% live in the Highlands, with an average area of farm land per person of 0.86 hectares. This is projected to decrease to 0.70 hectares per rural inhabitant by 1990.

Guatemala continues to be a net importer of basic grains, especially of corn and wheat, and often of black beans, despite internal price floors that considerably exceed world market prices. These are the major staple foods of the majority of the rural, as well as urban population. In addition, supply and demand projections for Guatemala and other Central American countries indicate that significant deficits in many diversified crops can be expected in several CACM countries in the near and medium term.

Based on the available macro-economic information, it appears that any increased output for market to be achieved from the activities being financed under this project do not face a demand constraint. On the contrary, it appears that such output will assist the Guatemalan foreign exchange position by substituting for imports in the case of basic grains, and by supplying export markets in the case of other products. In this latter case, the output also will assist in meeting rising demand for domestic consumption of diversified crops and livestock products.

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* Portions of this section were taken from a special report on Guatemalan Agriculture Review, Fred L. Mann, ATAC Oct. 1975

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Three of the four sub-projects lend themselves to cost-benefit and internal rate of return analyses. These are: (a) new lands settlement, (b) access roads construction, and (c) land and water resource improvement. The fourth project, Human Resource Development, is a more generalized institutional development effort which does not lend itself to cost/benefit analysis.

2. New Lands Settlement Activity

A contract study of the new lands settlement project* included a profitability analysis of the new farm enterprises to be established, and a social profitability analysis of the development of the Ixcán sector.

In terms of farm enterprise profitability, the study concludes that the farm family will initiate cropping in year one with 1.5 hectares and will have 7.4 hectares in production by the end of year 6. In comparison, a farm budget was synthesized** utilizing the reported data to ascertain additional financial returns to the farm family labor and the returns to economy.

With an enterprise mix of corn, beans, rice, cardamom and livestock, annual net farm returns amount to 35%, while the returns to farm family labor and management provide a return of over 50%. If a subsistence deduction is made, the aggregate economic returns to land, capital, management and risk for the project approaches 31%.

By including borrowings of $150 in year one for house construction and implement purchases, and providing production credit at 8% for agricultural inputs requested in the low-

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* Framework for analysis and planning of new lands settlement for the Franja Transversal, by Dean F. Schreiner and J. David Flood, October, 1975

** Farm Budget Program - M.C. DeMetre, LA/DR, Washington, D.C.

medium level technology cropping pattern, the appropriate level of credit demand for all new settlers would amount to $330,000 in year 2, $103,000 additional in year 3, and $500,000 additional in year 4 for a total uncapitalized amount of $933,000 over four years.* Presently, it is anticipated that eight percent medium term credit, with a maximum of 3% default rate would require initial capitalization amounting to $767,000. Debt service to term, five years with average farm family payments of $50/year.

From the standpoint of the individual farmer, prospective returns appear quite good. Accounting for the residual value of land and other fixed assets, the future market value of an 8-hectare farm in year ten would approximate $4,180. Disposable income estimates consistently show that achievements of family subsistence requirements and cash income increases can be anticipated.

The study concludes that a minimum size plot should be about 8 hectares, and to allow for variations in soil quality and topography could be increased to up to 15 hectares. It would appear difficult to justify plot sizes larger than 15 ha. given income, equity and spread of community facilities as principal objectives.

For social benefits and costs, total present value of public infrastructure disbursed over three years was calculated at $[illegible] per year per farm family. (See Economic Analysis: Farm Budget Project & Administration Costs). When subjected to 50% shadow wage rate for farm family labor the total project will provide an economic return of 31%. The project set was treated to a sensitivity test of 15% reduction in benefits and 15% increase in construction costs and produced acceptable returns greater than 15%, i.e., the opportunity cost of capital.

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* This assumes that 25% of production credit needs will be met with family savings.

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If it were considered necessary to recoup all development costs from the sale of land to settlers, this could be achieved by charging up to $61 per hectare, depending on the cost of the primary access road. An alternative for recouping costs would be to charge a lesser rate for the land and develop a taxing mechanism which captures a part of the additions to the economic value of land over time. Such a taxing system would be appropriate in the future to finance the expansion of public services.

A final sensitivity test was formulated to reflect the complete absence of cardamom which is anticipated in the project area. (Cardamom, a tropical spice, has been marketed in several areas, one of which was Sebol at the eastern end of the NTS.) Beginning in 1973, representatives of Middle-Eastern companies have developed Guatemalan contracts for the spice in unlimited quantities. However, since the actual project area has not been agronomically tested with regards to the micro-climate acceptability, yield rates, pests, etc., it was determined that a reiteration of the Farm Budget would be prudent without the anticipated Cardamom Spice. The outcome, in lieu of no spice (or cash crop) alternative, produced returns to economy of [illegible], returns to labor and management of over [illegible]%, and [illegible] to capital, land and labor of 19%.

3. ECONOMIC ANALYSIS FOR RURAL ROADS

Introduction and Summary

The overall purpose of this section is to illustrate the types of analyses which are appropriate for the rural access roads evaluations. Three classes of terrain and three degrees of road construction are contemplated in the project. Accordingly, the following examples of economic appraisals were calculated to illustrate the returns on three road construction types in the more predominate highland terrain. The procedures and methodology set forth in the following technical analyses were based upon increased benefits resulting from supportative agriculture extension efforts and the employment generation aspect. The outcome of each sub-project analysis was tested to a sensitivity of a 10% decline in benefits and 10% increase in construction costs respectively.

In sum, the analyses yielded the following results:

Project/Km Type	Sensitivity of Benefits (-10%)	Sensitivity Costs (+10%)	Overall Economic Rate of Return
San Gaspar Ixchil/Route 7W 4 Km of penetration road	23%	22%	24%
Santa Maria-Chiquimula San Antonio-Llotenango 20 Km of Type II	30%	31%	34%
Ixchiguan-San José Ojetenam 12 Km of minor up grading	29%	29%	32%

The proportional average of Road Types was extrapolated and measured against the total access roads component costs. By using the above outcomes, along with the distribution of similar type roads, a rough order of overall project worthiness was determined. That determination suggests that cet. par., in the road configuration an overall economic rate of return would approach 30%.

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Project Appraisal

Since the mix of roads types vary considerably between penetration roads (Type 1), major reconstruction (Type II) and minor road component construction (Type III), separate appraisals were prepared to demonstrate the suggested methodology* for each type (or class) of roads, and to illustrate the economic worthiness of each. These methods of project analysis are based upon the more classic approach to penetration roads, user savings and engineering-economic analysis, all which when subjected to the socio-benefit criteria in the economic accounts demonstrate the project viability from the viewpoint of society as a whole. Analyses on the remainder of the proposed roads will be accomplished by a project economist utilizing professional inputs of Civil Engineers and Agronomists from the GOG Highway Department, and Ministry of Agriculture respectively.

The project analysis team will visit each project area to ascertain the levels of farm technology, analyze the land expansion possibilities and coordinate road alignments. Since, the pre-selection of potentially attractive roads (as listed in Annex B) has virtually passed the more general identification criteria, final selection should be based upon economic rationale in view of resource restraints and scarce capital resources. The best gauge for the final project selection is probably the minimum attractive return. That return, expressed as the opportunity cost of capital is suggested herein as the measure of project acceptability.

Among other things, the economic analysis as applied to project selection gives rise to efficient utilization of all resources, including the stock of highways and secondary roads. This rationale further provides the GOG with the assurance that scarce resources will be allocated to projects with returns greater than alternative investments within the rural sector, and provides an introduction to economic analysis. Over time, the exercise should lead eventually to a planning section capable of developing projects of their own, along with the appropriate economic analysis, adequate for submission to the international lending institutions or other national ministries.

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*See Annex E Exhibit 12 for details.

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Project Selection

As mentioned earlier in Part II B.2 a-g, guidelines for the objectives of road improvement are clearly set to maximize quick social impact through employment as well as increasing production and farm incomes. The combined objectives of the National Planning Council, Department of Highways, USAID and IDB although quite similar in this program, are not coincidental. This is because employment generation as viewed in the road construction aspect is short termed and non-continuous as opposed to increased farmer benefits which are of a more long term nature. In this light, several objectives must clearly be counted while ensuring maximum small farmer participation. In the Type II and III roads, the unskilled labor employed in the construction component may well be the same small farmer receiving benefits for the longer term. This presents a minor problem in wage determination with regards to shadow wage rates (SWR) as perceived by the economists, but can be overcome in high unemployment areas with special care during the SWR calculations.

General Economic Procedures

Project Life

The analysis follows the typical geometric design set forth in the technical section for all weather roads. The limiting criteria illustrated in the Technical Analysis suggests that roads of this nature usually deteriorate within 10 years through normal wearing, weathering and erosion of side slopes. More important, assuming the road fulfills our developmental expectations, it should have reached its volumetric vehicle capacity at some point within its economic life. At that juncture, a new project investment may be required, including perhaps reshaping of the roadbed, minor realignments, and widening. Obviously, the residual value at the end of the road life is not zero, because the roadbed represents a substantial investment in future construction costs. This should be accounted for in the economic analysis as a residual value to the project. It is usually represented as a discrete cash income at the termination of project life (i.e. the 10th year). Generally, it is felt prudent to allow 20 percent of the initial road cost as the residual value for the roadbed. On the other hand, concrete culverts and bridges should be assigned with economic

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lives somewhat greater than 10 years.

Participation and Adaptation Rate:
The Small Farmer Viewpoint.

Historically, agriculture projects associated with rural roads are often measured on the basis of total participation of small farmers encompassed within the road zone of influence. Realistically, however, some farmers will be able to meet the project requirements and objectives others will not. Therefore, some factor of adaptation must be derived to reflect the uncertainties as perceived by some farmers, their level of management capacity, or the percentage of achievers to non-achievers envisioned by the appraiser in each community. Experience in neighboring countries with like projects has shown that only 50 to 75 percent of the farmers will participate fully. It is suggested herein that a conservative figure of 50% be utilized.

As an illustrative example, the first year of project participation was selected to reflect the simplicity of the measures to be introduced in these areas and other associated problems of overcoming the adjustments of technological change. The adaptation and participation rates of farmers thus set, requires a simple algebraic calculation to determine the amount of total benefit to charge to the project and the timing of its impact.

Inflation and Price Differentials:

Generally, in the economic analysis, inflation is not considered because of expectations that as costs inflate so will benefits although they may lag somewhat. A concensus of economic opinion* suggests that from the national viewpoint, transfers that take place between debtors and creditors during inflationary periods tend to cancel one another. Since in Guatemala, the predictability of future prices with regard to inflation still requires substantial guesswork, it is recommended to use present prices in the analysis for both costs and benefits. Cost differentials may be used in the sensitivity analysis to reflect possible discrete shifts

*Economic Evaluation of Investments in Agriculture Penetration Roads in Developing Countries, W.W. Shaner, SRI Menlo Park.

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in prices or materials. On the other hand, the financial analysis, which estimates the loan requirements and government expenditures, should reflect the inflationary effects as they relate to credit, construction and technical assistance. Therefore, in compliance, a provision was included in the costs to reflect a 10% inflation rate during the loan disbursement period.

Transport Costs and the Farm Gate Price

Given the nature of the traditional crops, surplus should be measured before consumption on the farms excluding the amount that may be used to increase barnyard animal counts such as livestock or chickens. Since all surplus generated in this program is expected to be transported to the nearest domestic market, farm gate prices should be adjusted to reflect the possible shifts in transport modes (i.e., such as headloads to mule, or mule to trucks). Competitive wholesale and trucking markets imply logically, that some savings will be passed on to the area farmers. It should also be noted that increased family consumption is always treated strictly as a benefit, and that, animal feed is regarded as a production cost and therefore excluded in the net farm yield.

The Shadow Wage Rates (SWR) Unskilled Farm Labor

In the economic analysis shadow wage rates are defined as the social opportunity cost of employing a previously unemployed man. Where unemployment is high it is sometimes taken to be zero. This is based largely on the grounds that there is no reduction in marketed output elsewhere in economy as a consequence of this labor being employed on the project. That approach (the zero assumption) has not been taken here, for the following reasons:

1. Men registered as being unemployed are not necessarily--and not typically--completely idle and unproductive. They may be performing useful work in the household sector, such as gardening, cow herding, etc., in self employment, for example in agriculture or in petty trade; or as casual laborers in off farm activities.

2. To say that the opportunity cost of employing an unemployed man is zero ignores the costs of working incurred by the man himself. These include not only any

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[illegible] or [illegible] foregone but also--particularly in the case of manual work--additional caloric intake to meet higher energy requirements, wear and tear on clothes; the costs of transportation to and from work; and non-pecuniary costs (as perceived by the worker) of working on this particular job rather than doing whatever he was doing previously (i.e., the reservation price). Further, based upon project expectations a decline in unemployment is expected, due to increased demand for labor on expanded farms.

The coincidence of unskilled hired farm and construction labor demand also presents a problem in the calculus of economic wage rates because, as harvest seasons approach, road construction is underway and hired farm labor may be attracted to the construction activity. The difficulty of the disaggregation task involves the measurement of the degree of overlap between harvest and construction which is also interrelated with the diversity of crops and regional climate.

As a consequence of these factors, shadow prices for farm family labor in the highlands have been assigned rates varying from $[illegible] to $0.30 per day per person as unemployment declines linearly from 30% to 15%. The application of the shadow wage rate was made during the first five years of the project and at $1.50 per day (market wage rate) thereafter. The shadow wage for hired labor is considered to be the same rate as for farm family labor.

Redistribution of Income:

The project, [illegible] to assist the low income rural population, has certain income redistribution aspects. While no attempt has been made to introduce distributional considerations into the economic analysis (such as by attaching distributional weights to the various costs and benefits), the way in which labor has been shadow priced involves an implicit distributional judgment. By shadow pricing labor at [illegible], one third of the wage paid, the assumption is made that the other two-thirds of the wage payment does not represent a real cost, but rather a transfer from the GOG (or the rest of society) to the workers employed on the project. This judgment was influenced by the consideration that since most of the workers to be employed are relatively poor, the transfer would make for a more equal distribution of income. It would be inappropriate to regard

this transfer as being socially costless if it were thought that the funds could be used for socially more beneficial purpose if retained by the GOG than when paid out to workers.

Sensitivity Analysis:

In the illustrative Farm Aggregation approach, values of principal factors were varied to test the sensitivity of project viability to alternative assumptions of values. Two conditions were derived; (1) to reflect the reduction of benefit expectations by 10%, and (2) to prolong the time of construction to examine what impact this had on the rates of return. Other constraints included in these analyses were time or labor requirements at key periods of the year, market outlets and production allotments. In the illustrative analysis, provisions were made for areas incorporating farm gardens, farmstead, and roads. Gardening even on a small land area may yield substantial amounts of output for the family food supply. Therefore, garden production was not subjected to the sensitivity analysis because the farmer views this is an "insurance crop" which is held as his highest priority of endeavor.

The sensitivity analysis performed did not include the evaluation of institutional variables, such as success in effective operation of cooperatives in buying inputs and selling farm products, appropriate extension of credit and effective collection of project charges. These, too, will have an important impact on any project, but fall outside the analytical process followed.

Non-quantifiable Benefits

Not considered in the quantitative analysis were the non-quantifiable social benefits made available to the small farmer through the project. These include improved access to educational facilities and health services, and more frequent visits by vendors of soft goods and services.

Further, the salutory effect on the output of regional commercial farms which may benefit from adoption of some aspects of the new technology or from the improved facilities which become available in the area have not been accounted for. Also, increased production induced by agricultural processing industries, trucking, and cottage industries has not been included in the quantification or benefits.

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d. Irrigation and Soil Conservation

A controlling approach in the design of this activity is that all construction works required must be technologically simple in both design and construction. Simplicity of low cost structure design and adaptation to site specific conditions will be one of the strong points of the mini riego labor and materials. Because labor intensive methods are envisioned, it is essential that nearly all construction be of a technical level that can be understood and performed by the farm people in the project areas. Constructing diversions, digging canals, furrowing, contouring and terracing will all be done by manual labor from the immediate site area. Additionally, maximum use will be made of local materials. The irrigation engineering advisor will review the proposed structures of each site with the above in mind.

Based on the observations of some 25 sites by a U.S. irrigation engineer, the technology for this project closely reflects existing socio economic and technical conditions in the project areas and will be appropriate to the in-country mini-riego teams capability (augmented with technical assistance).

With respect to laws governing water access and use, the Constitution follows the principal that land adjacent to permanent navigable waterways belongs to the nation (except private lands inscribed before 1894). Traditionally, water use has been governed by the civil code (latest issuance was 1963/64). Basically, the code follows the constitution i.e., ground water belongs to the man who owns the land, and navigable surface water belonged to the nation. The 1963-64 issuance included a provision to the effect that use and benefit of water will be governed by special agrarian and water laws, although none were in existence in 1964.

Subsequently, Reglamentos were issued by the President which regulated use of water for irrigation purposes, set bases for levying tariffs, and provided for creation of irrigation districts. These laws were passed principally to regulate large-scale irrigation projects which were to be financed under an IDB loan.

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As explained to USAID by the Ministry of Agriculture Legal Advisor there are two principal provisions in these laws which will have to be taken into account when designing mini-riego projects:

1) If a person or entity (farmer, village or mill) is using water downstream, quantities needed by these entities or individuals must be assured.

2) If someone requires access to water and the water must pass through another person's land, this latter person cannot deny access and he cannot charge for the right of way. Disputes arising over access can be settled at the municipal level and do not require a lawyer.

The Mission has been assured by the Ministry legal advisor that no legislation exists which would prevent mini-riego projects from being carried out and no additional legislation is required in order to implement the project. Obviously, existing regulations will have to be considered in each case, however, to ensure that violations will not occur.

Detailed analyses of the potential impact of irrigation were carried out on six representative project possibilities in the Highlands. Annex I, Exhibit 8 provided the details of these studies. The table below summarizes the findings:

SUMMARY TABLE

6 Mini Riego Sites

	Disp. Income without irrigation Per Fam. 2 ha. Farm	Disp. Income with irrigation Per Fam. 2 ha Farm
1. Sepold	$628	$2,838
2. Nahuala	628	2,867
3. Totonicapan	628	2,660
4. Dug well-pump Chimaltenango	464	2,354
5. Community Lake System	628	2,586
6. Sepold & lined canals (Note: Slightly less than 2 ha.)	464	2,707

D. Financial Analysis and Plan

1. Financial Summary

The total cost of this five-year project is estimated at $25,284,000 of which $13,000,000 will be financed with AID loan funds and $1,875,000 with Grant Funds. The Government of Guatemala will contribute the equivalent of $7,909,000 during the life of the project, of which approximately $6,000,000 will be new budgetary inputs. In addition, the GOG will expend approximately $2,740,000 after the AID loan is disbursed for continuing credit support for settlers in the colonization project.

The following four tables illustrate the financial aspects of the project.

Table 1 is a summary of cost estimates and financial plan for the project. As indicated in this table, AID will finance 53% of total project costs, and the remaining 47% will be Government of Guatemala counterpart contributions.

Table 2 is an annually time phased presentation of project expenditures. As indicated in this table 70% of project expenditures will occur during the middle three years, because of the timing of start up activities and related costs and in order to meet construction schedules.

Table 3 illustrates the relative annual project contributions required by AID and the Government of Guatemala. This relationship of AID and GOG inputs is stated by component to illustrate the proportionate investment of each Government to major project activities.

Table 4 presents the financing plan for the project by major output elements as a function of the input activities which contribute towards their generation. Unit inputs have been allocated to each output activity so that output budgeting and cost data can be controlled, accumulated and evaluated for project implementation and monitoring purposes.

2. GOG Counterpart Availability

Although the proposed loan will be implemented in a favorable economic environment and will place

no strains on the country's debt service capacity, there is the more immediate question of whether or not the GOG will be able to provide the necessary counterpart.

As an active agent in the development process, the Guatemalan public sector's role has heretofore been rather limited. In recent years the size of the sector has remained practically unchanged in relation to the economy as a whole. Public sector revenues have been about 11% of GNP, but after a modest peak in 1972 have tended to decline and are estimated to be about 10.6% in 1974. The deterioration was mostly attributed to an inelastic response of central government revenues to increases in output and incomes. In general, public sector expenditures have tended to follow the same pattern as revenues while capital expenditures have fluctuated widely (as a proportion of GNP). The overall fiscal deficit has experienced uneven swings and since 1971 has been financed mostly from internal sources.

Central Government operations (which account for about 80% of public sector revenues and expenditures) have traditionally been modest. The ratio of central government revenues and expenditures to GNP is the lowest in Central America. From 1969-73 the growth of Central Government revenues fell behind the growth of GNP and their ratio fell from 9.9% of GNP in 1969 to 8.4% in 1973. Outlays for fixed capital have also been low when compared to gross domestic investment. These trends underwent considerable changes in 1974, with revenues rising by 19% due mostly to higher yields on internal trade and stamp taxes. Current expenditures increased by 27% and capital expenditures were also up sharply. There are several new factors which must be considered in making revenue projections, and these have been incorporated into the projections.

First, in September, 1974, the GOG introduced a tax package which although heavily regressive, most observers feel will raise more revenue. Next, a USAID financed cadaster survey will be completed soon and this will expand the land tax base and have a favorable effect on revenues. Largely as a result of these reforms but also owing to improved tax collections, total current revenue receipts increased 34% between the first semester of 1974 and 1975. Finally, it appears that there may be a commercial quantity of oil in Guatemala - conceivably enough to meet internal requirements and even enough for exports. Since

the GOG will be receiving at least 51% of the petroleum (at the well head), we can anticipate a considerable increase in Central Government revenues. However, confirmed estimates of oil reserves are not yet available, so the full impact on revenues cannot be determined.

With the above serving as background we can now place the GOG counterpart requirements in perspective. According to the financial plan, the GOG will have to provide $6.0 million in counterpart over the four-year disbursement period, or $1.5 million annually starting in CY-1977. The proposed budget of the Ministry of Agriculture will be $24.3 million in 1976 and probably close to $26 million in 1977. The counterpart would then represent almost 6% of the 1977 budget, or an amount equivalent to the total amount of the increase received in 1977. Such an increase should not be difficult for the GOG. However, the 1½ million increase would represent only ½% of GOG current revenues and about ⅛ of one percent of total revenues. In view of the county's overall economic prospects we do not believe the GOG will have any difficulty in meeting the loan requirements.

A final consideration is that the GOG has traditionally placed a high priority on USAID loans and has provided the required resources in a timely manner. We have been given reasons to believe that the same high priority will be maintained for the proposed loan.

TABLE I

SUMMARY COST ESTIMATE AND FINANCIAL PLAN
(US $000)

	AID Loan FX	AID Grant FX	GOG LC	TOTAL
I. LAND SETTLEMENT ACTIVITY				
Cooperative Infrastructure and Services	$1,590.0	$ ---	$ ---	$1,590.0
Production and Medium-Term Credit	2,000.0	---	---	2,000.0
Secondary Roads & Social Infrastructure	910.0	---	362.0	1,272.0
Technical Assistance & Services	---	435.0	960.0 1/	1,395.0
Cadaster and Land use Studies	1,100.0	---	552.0	1,652.0
Sub-Total	5,600.0	435.0	1,874.0	7,90[illegible].0
II. ACCESS ROADS				
A. Construction				
1. Engineering	---	---	150.0	150.0
2. Supervision	330.0	---	---	330.0
3. Administration	---	---	260.0	260.0
4. Construction	4,570.0	---	1,680.0	6,250.0
B. Maintenance	---	---	418.0	418.0
Sub-Total	4,900.0	---	2,508.0	7,408.0
III. LAND RESOURCES IMPROVEMENT				
Personnel Costs	81.0	---	207.0	288.0
Operating Expenses	42.0	---	70.0	112.0
Vehicles	48.0	---	---	48.0
Equipment & Supplies	13.0	---	13.0	26.0
Credit Fund	500.0	---	---	500.0
Social Payment Fund	125.0	---	125.0	250.0
Contingency (8.7%)	71.0	---	36.0	107.0
Technical Assistance	---	330.0	---	330.0
Sub-Total	880.0	330.0	451.0	1,661.0

	AID Loan FX	AID Grant FX	GOG LC	TOTAL
IV. HUMAN RESOURCES				
Personnel Costs	$ 327.2	$ ---	$1,586.6	$1,913.8
Technical Assistance	---	825.0	---	825.0
Operating Costs	192.8	---	832.2	1,025.0
Equipment & Supplies	191.0	---	106.0	297.0
Contract Services	190.0	---	280.0	470.0
Vehicles	94.0	---	---	94.0
Training Costs	---	---	171.0	171.0
Scholarships	625.0	---	100.0	725.0
Sub-Total	1,620.0	825.0	3,075.8	5,520.8
V. TECHNICAL ASSISTANCE FOR:				
Marketing Services	---	195.0	---	195.0
Market Town Services	---	90.0	---	90.0
Sub-Total	---	285.0	---	285.0
GRAND TOTAL	$13,000.0	$1,875.0	$7,908.8 2/	$22,783.8

PROJECT FINANCIAL SUMMARY

	AID	GOG 3/	OTHER 4/	TOTAL
Contributions	$14,875.	$10,649	$2,500.	$28,024
	53%	47%		100%

1/ Represents technical assistance teams, cost of teachers, health and other services. This includes $345,000 allocated to loan-funded vehicles and $615,000 which pertains to the grant portion of the project.

2/ Recurring GOG budgetary resource

Pertaining to project activities	$1,909
New resources to be budgeted for project implementation	6,000
Total Counterpart Contributions	$7,909

3/ Includes $2.74 million for credit to settlers in project years 6, 7 and 8.

4/ In-kind labor contributions of new settlers.

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TABLE II

SCHEDULE OF PROJECT EXPENDITURES
(US $000)

	YEAR					
	1976	1977	1978	1979	1980	TOTAL
I. LAND SETTLEMENT ACTIVITY						
Cooperative Infrastructure & Services	$ ---	$ 190.8	$ 349.8	$ 508.8	$ 540.6	$1,590.0
Production & Medium-Term Credit	---	100.0	120.0	460.0	1,320.0	2,000.0
Secondary Roads and Social Infrastructure	---	199.8	331.8	431.0	309.4	1,272.0
Technical Assistance	91.5	265.2	356.2	355.7	326.4	1,395.0
Cadaster and Land Use Studies	---	826.5	825.5	---	---	1,652.0
Sub-Total	91.5	1,582.3	1,983.3	1,755.5	2,496.4	7,909.0
II. ACCESS ROADS						
A. Construction						
1. Engineering	---	100.0	25.0	15.0	10.0	150.0
2. Supervision	---	45.0	72.0	108.0	105.0	330.0
3. Administration	---	35.0	77.0	87.0	61.0	260.0
4. Construction	---	1,047.0	1,552.0	1,858.0	1,793.0	6,250.0
B. Maintenance	---	11.0	60.5	132.0	214.5	418.0
Sub-Total	---	1,238.0	1,786.5	2,200.0	2,183.5	7,408.0
III. LAND RESOURCES IMPROVEMENT						
Personnel Costs	---	72.0	72.0	72.0	72.0	288.0
Operating Expenses	---	28.0	28.0	28.0	28.0	112.0
Vehicles	---	48.0	---	---	---	48.0
Equipment and Supplies	---	10.0	6.0	5.0	5.0	26.0
Credit Fund	---	50.0	100.0	150.0	200.0	500.0
Social Payment Fund	---	25.0	50.0	75.0	100.0	250.0
Contingency (8.7%)	---	20.2	22.4	28.7	35.7	107.0
Technical Assistance	75.0	110.0	110.0	35.0	---	330.0
Sub-Total	75.0	363.2	388.4	393.7	440.7	1,661.0

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	YEAR					
	1976	1977	1978	1979	1980	TOTAL
IV. HUMAN RESOURCES						
A. Sector Planning and Coordinating Office						
1. Personnel Cost	$ ---	$ 338.2	$ 338.0	$ 347.8	$ 337.8	$1,361.8
2. Technical Assistance	178.7	275.0	275.0	96.3	---	825.0
3. Operating Cost	---	100.0	100.0	100.0	100.0	400.0
4. Equipment & Supplies	---	100.0	---	---	---	100.0
5. Contract Services	---	80.0	100.0	100.0	100.0	380.0
B. Pre and In-Service Training						
1. Personnel Cost	52.8	52.8	52.8	52.8	52.8	264.0
2. Operating Expenses	50.0	50.0	50.0	50.0	50.0	250.0
3. Vehicles	94.0	---	---	---	---	94.0
4. Equipment & Supplies	105.0	23.0	23.0	23.0	23.0	197.0
5. Contract Instructional Serv.	20.0	20.0	20.0	20.0	20.0	100.0
6. Training Costs	31.0	35.0	35.0	35.0	35.0	171.0
7. Repair of Atitlán	15.0	---	---	---	---	15.0
8. Institution Salaries	57.6	57.6	57.6	57.6	57.6	288.0
9. Amatitlán Operational Costs	70.0	70.0	70.0	70.0	70.0	350.0
C. Scholarship Program	---	211.5	384.0	129.5	---	725.0
Sub-Total	674.1	1,413.1	1,505.4	1,082.0	846.2	5,520.8
V. TECHNICAL ASSISTANCE FOR:						
Marketing Services	85.0	110.0	---	---	---	195.0
Market Town Services	40.0	50.0	---	---	---	90.0
Sub-Total	125.0	160.0	---	---	---	285.0
GRAND TOTAL	$ 965.6	$4,756.6	$5,663.6	$5,431.2	$5,966.8	$22,783.8

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TABLE III

SMALL FARMER DEVELOPMENT LOAN

DETAILED COSTING
(US $000)

	Total Project	1976		1977		1978		1979		1980		TOTAL	
		AID	GOG	AID	GOG	AID	GOG	AID	GOG	AID	GOG	AID	GOG
I. LAND SETTLEMENT ACTIVITY													
A. Cooperative Financed Activities:													
1. Cooperative Staff in Field	230.0			27.6		50.6		73.6		78.2		230.0	
2. Central Cooperative Buildings	100.0			12.0		22.0		32.0		34.0		100.0	
3. Auxiliary Warehouse	80.0			9.6		17.6		25.6		27.2		80.0	
4. Living Quarters for Cooperative Personnel & GOG Technicians	70.0				8.4		13.4		22.4		26.8		70.0
5. Water Development for Centers	50.0			6.0		11.0		16.0		17.0		50.0	
6. Surveying and Marking Plots	100.0			12.0		22.0		32.0		34.0		100.0	
7. Surveying and Marking Urban Centers	25.0			3.0		5.5		8.0		8.5		25.0	
8. Cooperative Field Facilities	50.0			6.0		11.0		16.0		17.0		50.0	
9. Cooperative Marketing Equipment & Supplies (scales, bags, dryers, refrigeration, dehumidification)	75.0			9.0		16.5		24.0		25.5		75.0	
10. Equipment	300.0			36.0		66.0		96.0		102.0		300.0	
11. Vehicles Movable	60.0			7.2		13.2		19.2		20.4		60.0	
12. Air Transportation	50.0			6.0		11.0		16.0		17.0		50.0	
13. Working Capital for the Cooperatives	250.0			30.0		55.0		80.0		85.0		250.0	
14. Identification, Selection and Movement of Settlers	150.0			18.0		33.0		48.0		51.0		150.0	
B. Production Credit Medium-Term Credit	2,000.0			100.0		120.0		460.0		1,320.0		2,000.0	
C. Secondary Roads and Social Infrastructure													
1. AID Loan Funds													
a. [illegible] Sanitary and including maintenance of [illegible]	720.0			86.4		158.4		230.4		244.8		720.0	
b. School Buildings	100.0			12.0		22.0		32.0		34.0		100.0	
c. Health Facilities	15.0			1.8		3.3		4.8		5.1		15.0	
d. Airfields (STOL)	50.0			6.0		11.0		16.0		17.0		50.0	
e. Community Center Buildings	25.0			3.0		5.5		8.0		8.5		25.0	
2. Counterpart Funds													
a. Teacher Salaries	350.0				42.0		77.0		112.0		119.0		350.0
b. Technical Assistance teams	360.0				43.2		79.2		115.2		122.4		360.0
c. Air Transportation for GOG Technicians	50.0				6.0		11.0		16.0		17.0		50.0
d. Health Services	200.0				24.0		44.0		64.0		68.0		200.0
e. 24 Km. Secondary Roads	362.0			20.0	23.6	40.0	131.6		139.8			70.0	892.0
3. AID Grant Funds Technical Assistance	435.0	91.5		150.0		185.0		98.5				435.0	
D. Cadaster and Natural Resource Studies and Surveys of the SFS													
1. AID Funds Contract Services	1,100.0			550.0		550.0						1,100.0	
2. GOG Counterpart													
a. GOG Budgetary Allocations for Salaries and Support Costs	417.0				209.0		208.0						417.0
b. Survey of Boundaries to Settle 5,000 families	135.0												135.0
Sub-Total	7,809.0	91.5	---	1,127.6	97.5 -80.7	1,887.6	67.5 -33.7	1,296.1	469.9	2,176.2	1,388.2	6,085.0	1,874.0

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II. ACCESS ROADS													
A. Construction													
1. Engineering	150.0				100.0		25.0		15.0		10.0		150.0
2. Supervision	335.0			45.0		72.0		108.0		105.0		330.0	
3. Administration	260.0				35.0		77.0		87.0		61.0		260.0
4. Construction	6,250.0			715.0	332.0	1,132.0	420.0	1,403.0	455.0	1,320.0	473.0	4,570.0	1,680.0
B. Maintenance	418.0				11.0		60.5		132.0		214.5		418.0
Sub-Total	7,408.0	---	---	760.0	478.0	1,204.0	582.5	1,511.0	689.0	1,425.0	758.5	4,900.0	3,508.5
III. LAND RESOURCES DEVELOPMENT													
A. Personnel Costs													
1. Two Mini-Riego Teams	144.0			27.0	9.0	18.0	18.0	9.0	27.0		36.0	54.0	90.0
2. One Soil Conservation Team	72.0			13.5	4.5	9.0	9.0	4.5	13.5		18.0	27.0	45.0
3. Support Staff	72.0				18.0		18.0		18.0		18.0		72.0
B. Operating Expenses	112.0			21.0	7.0	14.0	14.0	7.0	21.0		28.0	42.0	70.0
C. Vehicles	48.0			48.0								48.0	
D. Equipment & Supplies	36.0			18.0		5.0	5.0		5.0		5.0	13.0	13.0
E. Intermediate Credit Fund	500.0			50.0		100.0		150.0		200.0		500.0	
F. Social Payment Fund	250.0			12.5	12.5	25.0	25.0	37.5	37.5	50.0	50.0	125.0	125.0
G. Contingency	107.0			15.8	4.4	14.8	7.6	18.1	10.6	21.8	13.9	71.0	56.0
H. Technical Assistance	330.0	75.0		110.0		110.0		35.0				330.0	
Sub-Total	1,661.0	75.0	---	307.8	55.4	293.8	94.6	261.1	132.6	271.8	168.9	1,210.0	451.5
IV. HUMAN RESOURCES													
A. Sector Planning and Coordinating Office													
1. Personnel Costs	1,361.8			166.0	172.2	70.0	268.0	24.0	323.8		337.8	760.0	1,101.8
2. Technical Assistance (Grant)	875.0	178.7		275.0		275.0		96.3				875.0	
3. Operating Costs	400.0			70.0	30.0	85.0	95.0	38.0	68.0		100.0	160.0	290.0
4. Equipment & Supplies	100.0			100.0								100.0	
5. Contract Services													
Computer Time	80.0				80.0		80.0		80.0		20.0		80.0
Evaluations	300.0			60.0		50.0	50.0	40.0	40.0		80.0	150.0	150.0
B. Pre and In-Service Training													
1. Personnel Costs	264.0	40.8	12.0	26.4	26.4		52.8		52.8		52.8	67.2	196.8
2. Operating Expenses	250.0	25.0	25.0	7.8	42.2		50.0		50.0		50.0	32.8	217.2
3. Vehicles	94.0	94.0										94.0	
4. Equipment & Supplies	197.0	98.0	17.0	3.0	20.0		23.0		23.0		23.0	91.0	106.0
5. Contract Instructional Services	130.0	17.0	17.0	13.0	10.0	5.0	15.0		20.0		20.0	25.0	75.0
6. Training Costs	171.0		31.0		35.0		35.0		35.0		35.0		171.0
7. Repair of Atitlán	15.0	15.0										15.0	
8. Institution Salaries	269.0		57.6		57.6		57.6		57.6		57.6		288.0
9. Anatitlán Operational Costs	350.0		70.0		70.0		70.0		70.0		70.0		350.0
C. Scholarship Program	125.0			182.5	29.0	231.0	53.0	111.5	18.0			625.0	1,[illegible]
Sub-Total	5,527.8	451.5	222.6	900.7	512.4	786.0	719.4	336.8	775.2	---	846.2	2,445.0	3,275.8
V. TECHNICAL ASSISTANCE													
Marketing Services	195.0	85.0		110.0								195.0	
Market Town Services	90.0	42.0		80.0								90.0	
Sub-Total	285.0	185.0	---	190.0	---	---	---	---	---	---	---	285.0	---
GRAND TOTAL	$22,783.[illegible]	$ 743.[illegible]	$ 222.6	$1,2[illegible]	$1,[illegible]	$1,[illegible]	$[illegible]	$1,465.0	$[illegible]	$[illegible]	$[illegible]	[illegible]	$[illegible]

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TABLE IV

COSTING OF PROJECT OUTPUTS/INPUTS
(US $000)

	Land Settlement I	Access Roads II	Land Resources III	Human Resources IV	Technical Assist. V	TOTAL
AID Appropriated						
Technical Assistance	$ 435.0	$	$ 330.0	$ 825.0	$ 285.0	$1,875.0
Contract Services	1,100.0			190.0		1,290.0
Salaries & Support Costs	430.0		123.0	520.0		1,073.0
Training						
Construction	1,210.0	4,570.0				5,780.0
Development Projects	50.0					50.0
Surveys & Studies	125.0					125.0
Equipment-Vehicles-Supplies	435.0		61.0	285.0		781.0
Credit Fund	2,250.0		500.0			2,750.0
Social Payment Fund			125.0			125.0
Scholarships				625.0		625.0
Supervision		330.0				330.0
Contingency			71.0			71.0
Sub-Total	6,035.0	4,900.0	1,210.0	2,445.0	285.0	14,875.0
Host Country						
Salaries & Support Costs	1,017.0	410.0	277.0	2,418.8		4,122.8
Technical Assistance	360.0					360.0
Surveys & Studies	135.0					135.0
Equipment-Vehicles-Supplies			13.0	106.0		119.0
Social Payment Fund			125.0			125.0
Contract Services				280.0		280.0
Scholarship				100.0		100.0
Construction	362.0	1,680.0				2,042.0
Maintenance		418.0				418.0
Training				171.0		171.0
Contingency			36.0			36.0
Sub-Total	1,874.0	2,508.0	451.0	3,075.8	---	7,908.8
TOTAL	$7,909.0	$7,408.0	$1,661.0	$5,520.8	$ 285.0	$22,783.8

IV. IMPLEMENTATION PLANNING

A. Administrative Arrangements

1. Government of Guatemala

The detailed project description contains much of the material dealing with implementation arrangements. It is summarized here for purposes of clarity.

GOG agencies will have the sole responsibility of project administration and all aspects of implementation. The Minister of Agriculture will be the maximum authority and responsible for the coordination of the various implementing agencies. Under the direction of the Minister the Vice-Minister will be the executing officer. The much strengthened Sector Planning Unit will be the Vice-Minister's staff office responsible for carrying out the daily activities required to meet schedules, draft documentation, make inspections and conduct evaluations. This Unit will also be responsible for managing and accounting for the allocation of AID and counterpart funds and the control thereof. This includes monitoring procurement of the implementing agencies and preparing disbursement requests.

a. Land Settlement

This activity will be implemented by selected cooperatives and groups that have the capacity to manage all elements involved. The Vice-Minister will take the actions required to cause transfer of the identified lands to the cooperatives in a timely manner. The resource studies and cadaster elements of the project will be in the direct responsibility of the Vice-Minister. He will also be responsible for actions required to cause access roads to be constructed in the settlement areas on a timely basis. This will be accomplished in close coordination with the cooperatives and the Ministry of Communications and Public Works.

b. Road Construction

The Highway Department of the Ministry of Communications will carry out the field activities by expanding upon its regional maintenance divisions for the

express purpose stated in the project description. To assure complete understanding of the responsibilities of all parties an agreement will be elaborated between the two Ministries setting forth their respective roles including the disbursement and management of project resources. Among other things, this agreement will contain a provision for contracting with a private firm to carry out periodic inspections of construction and certify that specifications have been complied with and that vouchers submitted for disbursement accurately reflect expenditures incurred.

c. Land Resources Development

DIGESA, a division of the Ministry of Agriculture, will be charged with implementing the irrigation and soil conservation activities. This requires re-orientation and strengthening some of its on-going activities. Responsibility will be delegated to the person in charge of Region I (Highlands) for operations and the persons engaged at the field level will report directly to him.

In the performance of this function DIGESA will, at the headquarters level, arrange for BANDESA to approve and administer credit requirements for the irrigation portion of the activity as a function of its on-going credit program. BANDESA will also be relied upon to serve as custodian of funds for making social cost payments to participants of the soil conservation activities. These funds will be allocated in accordance with DIGESA instructions. Inasmuch as INAFOR has developed a great quantity of current resource material in certain areas of the highlands including locations where small irrigation and soil conservation practices are recommended, DIGESA will enter into an agreement with it that will provide for free access to all of the material as well as for continuous consultation throughout the life of the project.

d. Human Resources

The Sector Planning Unit will be delegated direct responsibility for all aspects of the three elelents of this activity. It will establish policy and set the pace for in-service training by persons assigned this specific responsibility, and work closely with all the public sector agencies in order to assure that training is timely and effective.

It will review procedures for the selection of participants for study abroad and make any changes deemed appropriate to assure that institutional needs are met and that those selected for training meet the qualifications established. Procedures for gaining entry into foreign universities will be established in consultation with the USAID.

The Sector Planning Unit will also be responsible for initiating and/or reviewing all contracts with firms or individuals engaged in project related activities and financed with loan funds.

Reports required under the loan will be prepared by the Sector Planning Unit or by the other implementing agents under its close supervision. The Unit, under direction of the Vice-Minister, will be responsible for all reporting requirements required in the Loan Agreement as well as internal reporting within the Ministry required to move the project in accordance with project plans.

Periodic evaluations will be an integral part of the duties and responsibilities of this office. It will have the responsibility for performing the evaluations set forth as requirements in the loan document as well as others stipulated by the Vice-Minister in assessing the effectiveness of Sector programs and activities.

Then, and most important, the Sector Planning Unit with guidance from the Vice-Minister will have the responsibility for developing the capacity of the Unit through improved organization and staffing to fulfill its responsibilities created by this project in addition to its other Sector responsibilities. Staffing as contemplated during CY 1976 will greatly facilitate the performance as this project enters into operations.

2. A.I.D.

The conduct of this project does not contemplate an unusual role for the agency. Although project design is relatively simple, carrying it out to the maximum benefit of the intended recipients will require a lot of time and perseverance on the part of the Mission staff. Present staffing should be adequate to perform the monitoring function.

The Rural Development Division will have the responsibility for maintaining direct contact with the implementing agencies and contractors and for field inspection of activities. It will also be responsible for recommending any mid-course corrections required to accomplish the purposes of the project. This division will be provided close support by the loan division and the Controller's office. All divisions will perform their respective functions under the direct guidance of the USAID Director.

AID/W will be requested to assist from time to time with implementing matters with special emphasis on locating and selecting contractors and the design and conduct of comprehensive evaluations.

B. Evaluation Plan

The evaluation program should be designed to serve the individual farmer (better farm technology), the local organization to which the farmer belongs (better solutions to yield and income constraints) the project which intends to serve the farmer (improved impact of programs, increased efficiency) as well as the sector planners at the Ministry of Agriculture level (data which allows more effective use of development resources sector-wide). Each level in the information hierarchy has a different degree of detail necessary for decision-making. Only that information which is necessary should be requested from a lower level, or passed forward to a higher level. An example will make this clear.

First, the individual farmer, in his own unique circumstances would like to be able to maximize net income from his given resources. He may be able to make significant improvement based upon analysis of data from other farmers in similar circumstances, some of whom have found better (more optimizing) solutions for increasing farm yields and net income. If the farmers were better educated they could maintain their own farm records and compare their results to the "best" appropriately matched performance in the area. Since this is not the case in the area of AID-supported programs, such information can only be obtained by data collection, aggregation and analysis away from the farm, with the results transmitted back by the original collector, and through him to the farmer. The farmers will provide the necessary data so long as the feedback proves useful to them. Thus a first requirement is to design a data collection system which delivers back to the farmer a better understanding of how to improve his own income to make the time commitment worthwhile.

Similarly, the local organization in the area (which may draw BANDESA credit) has specific information requirements that would help it perform better, offer improved services to farmers, be more solvent. These needs should be designed into the information collection system, with unique data requested only by the organization left at that level without forward submission. The same holds true for the DIGESA promotors, who to obtain accurate data, must believe the information is useful in their work, (although

they should not believe there is a correlation between their reports of higher yields and income and their own upward mobility within DIGESA). Only if the farm level information can be analyzed by the Sector Planning Unit with the results returned to the project, to the local field staff, and to the farmers, will there be an interest in providing continuing, reliable data which can serve as the basis for systematic evaluation program.

The Organization of the Evaluation Responsibilities under the Sector Planning Unit

The Sector Planning Unit will have the primary responsibility for insuring that the operating programs of the Ministry of Agriculture in general, and those sponsored by AID in particular, undergo regular evaluation. The Information and Evaluation Division will be one combined office in the Sector Planning Unit, to insure that the knowledge gained in the data collection and analysis of ongoing programs in directly applicable, and compatible with, the sector's overall information requirements. Evaluations of AID-Supported projects will be designed as follows:

1. The Evaluation Unit may contract for special studies of interest to the operating agencies -- for example improving the repayment response given BANDESA's current small farmer loan delinquency rates. The office would have the economic and evaluation skills to determine what would be required from outside evaluations specialists, prepare the scope of work, oversee the research, shape the findings into recommendations for the Minister, and then help insure compliance with the resulting orders, particularly if they involve changes in data collection and analysis within an operating agency, of the Minister of Agriculture.

2. The Evaluation Specialists will also identify working closely with their collegues who specialize in information collection, a series of geographic samples based upon those areas in which AID-supported programs are operating. The samples would be made for type of data to be collected as follows: Indicator data of modernization, collected on relatively large geographic area such as sub-regions; behavior (production) practices of individual farmers, perhaps collected on 25% of the target population (with controls); farm records of input-output relations over the full year, perhaps collected on 5% of the target population (with controls). The

sample sets should include all important "strata" such as land holdings, neutral farming environment, distance from main communications networks and market centers, major crops. For the farm records data it will be necessary to construct a localized sample frame which allows contiguous farm units to be randomly chosen for data collection. This will determine where the sample will be drawn. The number units in the sample will depend upon the expected variance, the degree of precision required by the evaluation design, and the difficulty in obtaining the data (thus increasing the expense) to be used in the analysis.

For the various aspects of the AID Small Farmer Development Loan, the following sample size for farm records (the "hard" data), might be appropriate:

- The New Lands Colonization Component: 5% per year sample of new settlers continued over the five years of the project. This would be 20 the first year, 60 additional the second, 100 additional the third, 60 the fourth and 10 the fifth, a total sample of 250 by the fifth year, spread across five operating cooperatives, requiring 50 farm records be maintained per cooperative. By the fifth year, many of the farmers should be able to maintain their own records on a weekly basis (such a training should be one part of the collection process) which would reduce the visits to once a month by the extensionist -- a not impossible responsibility.

- The Water Resource and Soil Conservation Component: A 2.5% sample of adopters matched against a 2.5% control sample in the same community area. Both projects are intended to cover a total of 10,000 hectares in five years (an optimistic projection) with 500 hectares under farm records by the end of the fifth year -- assuming that each year 50 percent of the farmers can either recall their own records on a weekly basis, or require only monthly visits from para professionals or promotors, this is a "doable" sample.

- The Labor Intensive Roads Component: A 10% sample of the kilometers to be created, r paired or upgraded should be drawn randomly, with a 5% sampling population drawn from the chosen kilometers. Samples should include those on the road, 1-5 kilometers from road, and more than five kilometers away. The differential impact of the benefits should be measurable with this sample population.

3. Once the population to be sampled has been specified, there will be a need for an inventory of potential data collectors, or farm record "assisters". Some may be serviced by the DIGESA promotors, some by the paraprofessional "gufas", some by extensionists from cooperatives, or other private development assistance agencies. For each area, the collectors must be specified and a linkage developed between the evaluation designers in the Sector Planning Unit and the field collectors. Utilizing the programs funded under the Training Division of the Sector Planning Unit, the collectors will be trained in the particular techniques (recall data, continuing farm records, observation of production techniques, collection of indicator data to be used, with the data collection forms tested and refined by field experiment.

4. Once the data has been collected (or copied from the farm records on a regular basis) the next step is processing, preparing the data for analysis. This should be accomplished by the information specialists assigned to the Information and Evaluation Division of the Sector Planning Unit.

5. First call on the analysis results should go to the field collectors to return useable data to the farm level, based upon the most appropriate "optimum" farm plan under similar circumstances in the area. The next priority will go to the operating agencies, who will be asked to act upon the evaluation results. This will require the evaluation results to be more than a specification of level of success. To be useful, the evaluation must have a diagnostic capacity to point the way to better procedures and policies,which will improve project performance. This is the reason why the "hard" data on farm production and income must be complemented by discussions with farmers, meetings with project participants, and short studies investigating the "whys" of project performance, adoption rates, credit repayment, terracing, etc.

Examining the Three Data Types

Farm Records: The best data is obtained from continual observation of the farmers' inputs and outputs, making careful record of his costs and returns. Since this is rarely possible (except in PhD dissertation research) the next best method is a weekly record, obtained by an outsider if the farmer cannot do so himself, which documents the same activities from recall. Monthly or quarterly re-

call is less accurate, yearly a poor substitute for reliable data. Since many farmers utilize a rotation system which extends beyond a single year, the records should be continued over time. The keeping of the records will undoubtedly influence the production decisions of the farmer if the results are fedback, and thus there are no absolute "controls" since the act of measurement affects the performance being measured. However, the purpose of development is to obtain as wide a spread affect as possible, and if assistance with farm records and farm amanagement provides the impetus for production change, that in itself is a worthwhile finding.

The analysis of farm records is not straightforward, and will call for some sophisticated analytical techniques as the returns from total farm resources are to be maximized, rather than merely the return taken one crop at a time. Work is ongoing in ICTA on multiple cropping techniques, some of which have proven very optimistic. "Optimization" in this context calls for simultaneous equations with constraints (depending upon the amount the farmer has available for cash inputs), and/or a linear programming model. While these are the top end of the analytical spectrum, much simpler methods can be used to find the farmer who has earned the most from his given resources -- with the actual technology in use serving as a model for other farmers in similar circumstances.

- Production Behavior Changes: Full farm records are difficult to obtain, expensive, and time consuming to analyze. They are appropriate only for the smallest sample possible necessary for significant results within each important "strata" of Guatemalan farmer and natural environment. A technique with much wider application is the obtaining, by observation or farmer recall, of certain production practices which can be associated with increased net income if the data from farm records is available. The promoters guías, cooperative extensionists, even credit supervisors can extract information simply and quickly which will allow two evaluation judgements. First, the stage of production technique and thus optimization of the particular farmer, given his farm resources, and second, the spread effect of new technology which is being introduced into the area.

These techniques have been utilized by the Basic Village Education program, which found the data which leads to a determination of net farm income impossible to obtain

with confidence. Instead they adopted a behavior/practice method, utilizing indicators of seed selection, preparation techniques, fertilization at seed and flowering, spacing, harvesting, etc., as well as general yield estimations for their basic data. Then drawing upon an input-output matrix which has been developed for their area of operation in the Oriente, they are able to classify the farmer according to his stage of development. The full data analysis from their surveys has not been completed, nor has clustering or multi-correlation analysis tended to relate one set of indicators with another. However, this should be available early in 1976 and provide guidance on the creation of this set of data collection requirements in support of AID-sponsored projects.

- Area Indicators: Development may be captured by general indicators of economic activity. This may be particularly valuable in assessing the impact of the labor intensive road construction. While the indicators must be appropriate to the area the following may be useful on a before and after basis: 1/

- Number of stores, commodities available by type and price;
- Agricultural inputs, availability, sales and price;
- Agricultural outputs, availability, sales and price;
- Transportation availability and price;
- Sales of home improvement materials;
- Sales of farm investment items;
- Going price for daily labor; and
- Increased demand for production credit.

This data needs to be reviewed with some skepticism, however, and correlated with farm level indicators of behavior change and net income, since many projects can generate an

1/ In this instance "before" data can be collected with some reliability "after" the initiation of the project.

immediate income increase which is not based upon productivity and is thus lost when the external funds supporting the project are exhausted. While there is an obvious multiplier to increased cash income in the rural areas, a foreign trade analogy with the urban centers having a monopoly on the goods purchased with increased income is not a completely inappropriate model. This is one reason for the inclusion of other than direct economic measures of project performance in the following category of indicator data collection.

The following indicators suggest increases in small farmer welfare which are based upon other than income measures (but may be related directly to increased small farmer income):

- increased demand for and use of education;
- increased local capability to identify and solve local problems;
- increased responsibility for local decision-making;
- increased ability and determination to pay for essential services;
- increased knowledge of farming practices, new agricultural techniques;
- improved health and nutrition; and
- increased farmer functional literacy.

There is a fundamental requirement for the project to develop self-sustaining benefits -- benefits which remain after the external funding has moved to a new area. For this to happen the farmers must assume the responsibility for the services necessary for sustained growth, either providing them individually from accumulated knowledge and savings, or joining with other small farmers in mutually-beneficial and continuing efforts. The project must not only promote such independence, the evaluators should seek out and measure indicators of such activity. This can only be designed and accomplished in the context of the specific circumstances of the area's small farmers.

Matching the Evaluation Plan to the Indicators on the Logical Framework

The logical framework contains a set of indicators of OUTPUT, PURPOSE and GOAL which require evaluation at specific intervals. The evaluation points are specified in the PPTS system. At each point where the Means of Verification shows the Farm Records Evaluation System, then the output of the Evaluation Division of the Sector Planning Unit will furnish the appropriate data. This will be the difficult-to-capture, income and productivity data, as well as the spread effect of new technology and the general indicators of increased economic activity and small farmer welfare.

Other parts of the logical framework indicator system simply require a reporting format from the operating agency to AID. This is particularly true of the completion of the OUTPUTS: miles of road constructed, payments made to local farmers, colonialists moved, hectares irrigated, etc. These reporting requirements will be specified in project agreement.

C. PROJECT IMPLEMENTATION PLAN

The November 20, 1975 report by the SER/FM Team which visited six Test Missions contains the following summary pertaining to the relationship of the financial plan and the PPTS network system:

> "The PPT network of critical performance indicators is based on single events on the latest date at which achievement of such events become critical. The financial plan is based on projected accrued expenditures computed to the "expected" or planned dates of achievement. According to experts on the PBAR staff, the gap between these dates may extend up to two years. Also, the financial plan line is based on total project costs whereas a CPI normally represents a portion of the project costs. Obviously, the network and the financial plan are out of phase as to both time and magnitude. For these reasons, there is no apparent useful relationship between these two elements. In fact, this data might be misleading unless the user examines the underlying financial report(s)."

USAID/Guatemala's Controller agrees with this observation and concurs in the team's recommendation that: "The financial plan line should be deleted from the face of the PPT network of critical performance indicators because it cannot be related to the network in any meaningful way."

Because of the disparity between project accrued expenditures and plan of expected dates of achievement, we are not including accrued expenditure data on the PPT network.

country:	project no:	project title:	date:	/ / original / / revision #	approvd:

CPI NARRATIVE

1. 02-28-75 Project Agreement signed

2. 04-30-76 Loan Agreement signed

10. 08-31-76 Congressional approval

22. 12-31-76 Conditions Precedent met

LAND SETTLEMENT PROJECT

3. 06-15-76 Contract U.S. Technician

5. 07-31-76 Start development plan for locating 2,000 families on 19,000 has.

20. 12-31-76 Complete development plan for 2,000 families, 19,000 has.

23. 01-31-77 Complete agreement between GOG and Coop Federations to include land use, guidelines for land tenure, guidelines for transfer of title to individual tracts, form and time of payment, and services to be provided by GOG.

24. 01-31-77 Start aerial photography and ground survey for 290,000 has.

30. 02-15-77 Start construction 2,000 families 19,000 has. Phase I. This includes auxiliary warehouses, water development sawmills, health facilities, air fields and 30 Kms. access roads.

31. 02-28-77 Start semi detailed studies. 30,000 has. to include natural resources, land use, cadaster.

35. 07-31-77 Complete construction Phase I

38. 08-15-77 Start location of social and technical assistance services.

42. 10-01-77 Start location of 800 families.

50. 02-28-78 Complete location of social and technical assistance services.

51. 02-27-78 Partial completion of semi detailed studies, permitting development plan for 30,000 has. to start.

52. 02-28-78 Start development plan 3,000 families 30,000 has.

53. 03-15-78 Complete location of 800 families.

54. 07-15-78 Complete semi detailed studies, 30,000 has.

60. 08-15-78 Complete aerial and ground survey, 290,000 has.

62. 09-15-78 Complete all construction, 19,000 has., 2,000 families.

country:	project no:	project title:	date:	/ / original / / revision #	approl:

CPI NARRATIV

63. 09-15-78 Complete development plan, 30,000 has. 3,000 families.

64. 09-15-78 Start construction Phase I, 30,000 has. Note: See CPI 23 for description of Phase I.

72. 02-15-79 Complete construction Phase I.

73. 02-28-78 Start location of social and technical services.

74. 03-31-79 Start location of 1300 families.

76. 07-15-79 Complete location of 2,000 families, 19,000 has.

78. 09-01-79 Complete location of social and technical assistance services.

79. 09-31-79 Complete location of 1300 families.

85. 07-15-79 Complete construction 30,000 has.

86. 12-15-79 Complete location of 3,000 families, 30,000 has.

HUMAN RESOURCES

6. 07-15-76 Contract US technicians for SPCO.

7. 07-15-76 Contract US technicians Trg. Coord.

9. 08-01-76 Start staff selection and organization SPCO.

11. 09-15-76 Review trg. requirements and select universities.

15. 10-15-76 Complete initial design of evaluation system.

16. 10-15-76 Select perspective scholarship students.

18. 11-31-76 Complete initial design of Inf. System.

19. 11-31-76 Complete staff selection and reorganization SPCO.

21. 12-31-76 Complete development of 3 yr. detailed plan for pre and In-Service Training.

25. 01-15-77 Begin implementation of planning system. This includes only the information and evaluation aspects.

26. 01-15-77 Send seven students to scholarship training.

country:	project no:	project title:	date:	/ / original / / revision #	approd:

CPI NARRATIVE

32. 02-15-77 Start implementation of pre-In Service Training.

34. 03-31-77 Complete initial design of programming system.

36. 07-15-77 Send 17 students for scholarship training.

39. 08-15-77 Rehabilitation of Amatitlán training center completed.

43. 12-15-77 Adjust planning system based upon analysis.

44. 12-31-77 Complete procurement of training equipment.

48. 01-15-78 Send seven students for scholarship training.

55. 07-31-78 Complete procurement of all vehicles.

56. 07-15-78 Send one student for scholarship training.

57. 07-15-78 Complete scholarship training five students.

65. 11-15-78 Complete five year plan, 1980-1984.

67. 12-31-78 Complete scholarship training 10 students.

75. 06-30-79 Complete scholarship training 13 students.

80. 12-15-79 Make final adjustments in planning systems.

81. 12-31-79 Complete scholarship training 4 students.

87. 12-31-79 Complete training plan.

country:	project no:	project title:	date:	/ / original / / revision #	approval:

CPI REPORTING

Access Roads

4.	6-30-76	Contract private consultant and select staff for construction units.
12.	9-15-76	Complete road selection for 30% of roads to be constructed by contractor.
17.	10-15-76	Start procurement for equipment tools and spare parts.
27.	1-15-77	Prepare design and specifications for roads to be constructed by contractor.
33.	2-15-77	Start force account construction.
37.	7-15-77	Construction contractor's awarded for 30%.
40.	8-15-77	Complete road selection for 35%.
41.	9-15-77	Complete staff selection for 4 new construction units.
45.	12-31-77	Complete procurement of tools and spare parts.
49.	1-31-78	Prepare design and specifications for 35% of roads to be constructed by contractor.
58.	7-15-78	Complete all equipment procurement.
59.	7-31-78	Award construction contracts for 35% of roads.
61.	8-15-78	Complete selection of last 35% of roads to be constructed by contractor.
68.	12-31-78	Complete construction of 1st. 30%.
71.	1-15-79	Prepare design & specs. for 35% of roads to be constructed by contractor.
77.	7-15-79	Award construction contracts for final 35% of roads to be constructed by contractor.
82.	12-31-79	Complete construction of 35% of roads under contracts.
88.	12-31-80	Complete force account construction.
89.	12-31-80	Complete construction on last 35% of roads.

country: | project no: | project title: | date: | / / original / / revision # | approval:

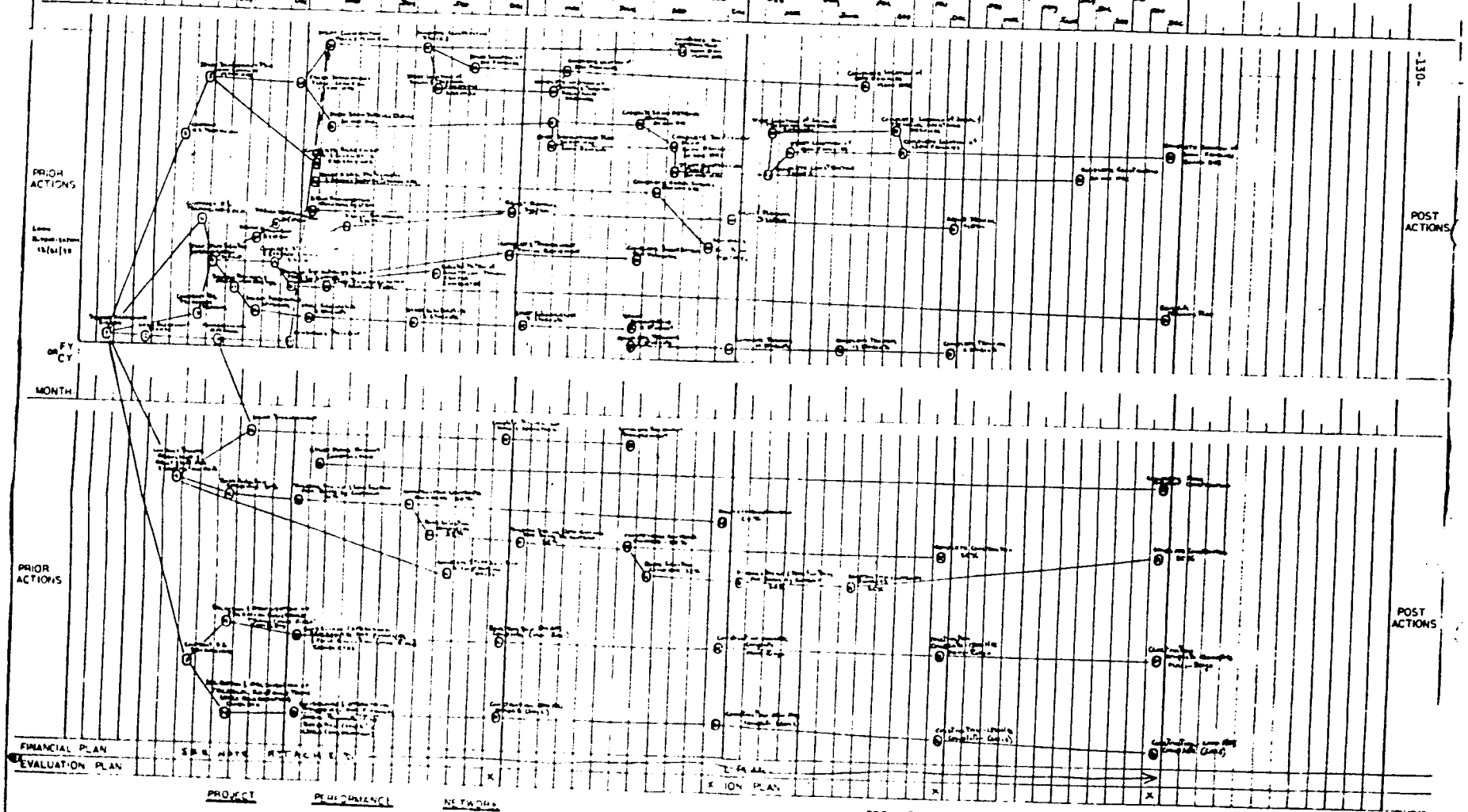
CPI NARRATIVE

LAND RESOURCES IMPROVEMENT

8.	7-15-76	Contract U.S. technicians for mini-riego and soil conservation sub-projects.
13.	9-15-76	Selection and organization of tech. assistance teams mini-riego complete.
14.	9-15-76	Selection and organization of tech. assistance teams soil conservation.
28.	1-15-77	Guidelines and operational procedures for financial and field execution in mini-riego complete.
29.	1-15-77	Guidelines and operational procedures for financial and field execution in soil conservation complete.
46.	12-31-77	Construction 500 ha. mini-riego completed.
47.	12-31-77	Construction 500 has. soil conservation structures.
69.	12-31-78	Construction of 1000 has. mini-riego.
70.	12-31-78	Construction of 1000 has. soil conservation.
83.	12-31-79	Construction of 1500 has. mini-riego.
84.	12-31-79	Construction of 1500 has. soil conservation.
90.	12-31-80	Construction of 2000 has. mini-riego.
91.	12-31-80	Construction of 2000 has. soil conservation.

COUNTRY	PROJECT NO	PROJECT TITLE	DATE		PPT APPD
GUATEMALA	520-L-026	SMALL FARM DEVELOPMENT	12/6/85	✓ ORIGINAL / REVISION #	

COUNTRY	PROJECT NO	PROJECT TITLE	DATE		PPT APPD
				✓ ORIGINAL / REVISION #	



D. Conditions Precedent and Covenants

1. Conditions Precedent to Initial Disbursement

Prior to the first disbursement under the Loan, Borrower shall, except as AID may otherwise agree in writing, furnish to AID in form and substance satisfactory to AID:

a. An opinion of the Ministerio Público or of other counsel acceptable to AID that this Agreement has been duly authorized and/or ratified by, and executed on behalf of, the Borrower, and that it constitutes a valid and legally binding obligation of the Borrower in accordance with all of its terms;

b. A statement of the names of authorized Borrower representatives for Loan Implementation purposes, and a specimen signature of each person specified in such statement;

c. Evidence that Borrower has appointed an overall Project Coordinator who will be an employee of Borrower with authority and responsibility for coordinating all aspects of the Project.

d. Evidence that the Borrower has appointed a Project Implementation Committee chaired by the Project Coordinator which shall have as members a representative of each staff and department office which is directly involved in project implementation.

e. Evidence that it has contracted with qualified individuals or a qualified independent consulting firm satisfactory to AID to provide the following technical services for the access road program:

(1) review and approval of final engineering plans, specifications and bidding documents;

(2) approval of construction materials and services contract awards;

(3) technical inspection of road projects during construction as a basis for certifying all construction disbursement requests before submission to AID.

f. Evidence that the Borrower has made arrangements satisfactory to AID, for obtaining technical assistance as needed to assist the Borrower in carrying out specific project activities as follows:

(1) land use planning and new lands settlement;

(2) small irrigation and soil conservation, and

(3) human resources training and development.

2. Conditions Precedent to Disbursement for Other than Consulting Services

Prior to any disbursement or to the issuance of any Letter of Commitment other than for Consulting Services, the Borrower shall, except as AID may otherwise agree in writing, furnish to AID in form and substance satisfactory to AID:

a. A detailed Financial Plan evidencing the annual GOG counterpart contributions which will be made to support the Project.

b. A detailed time-phased Implementation Plan covering all activities to be completed during the life of the Project.

c. A program staffing plan which includes the agricultural sector planning unit and the organizational entities responsible for land resources improvements, access road construction, new lands settlement and human resources development.

3. Conditions Precedent to Disbursements for Land Settlement Activity

Prior to any disbursement or to the issuance of any Letter of Commitment other than for Consulting Services for the Land Settlement Activity, the Borrower shall, except as AID may otherwise agree in writing, furnish to AID in form and substance satisfactory to AID:

Evidence that procedures and terms governing the transfer of blocks of Government land to cooperative

Federations or cooperative groups have been promulgated.

4. Covenants

The Borrower covenants and agrees that, except as AID may otherwise agree in writing, the Borrower shall:

a. Provide and utilize for the Project financial and other resources compatible with the Plan attached as Annex I to this Loan Agreement.

b. Adequately maintain all roads constructed under this Loan and budget and expend at least $30,000 in 1977; $80,000 in 1978; $160,000 in 1979; $240,000 in 1980 and $300,000 in 1981 for the maintenance and upgrading of these roads.

c. At the end of the Project's fourth year, provide AID with its plan for continuing the expansion of the Northern Transversal Strip land settlement program beyond the disbursement period of the Loan.

LIST OF ANNEXES

A. PROJECT TECHNICAL DETAILS

Exhibit 1 - Elements of an Agreement between the Government of Guatemala and Cooperatives Undertaking the Settlement of the Northern Transversal Strip

Exhibit 2 - Description of San Antonio Road

Exhibit 3 - List of Projects for Rural Road Program

B. BORROWER'S LETTER OF APPLICATION

C. MISSION DIRECTOR'S CERTIFICATION

D. DRAFT LOAN AUTHORIZATION

E. LIST OF SUPPLEMENTARY ANNEXES HELD IN OFFICIAL FILES

ELEMENTS OF AN AGREEMENT BETWEEN THE GOVERNMENT OF GUATEMALA AND COOPERATIVES UNDERTAKING THE SETTLEMENT OF THE NORTHERN TRANSVERSAL STRIP 1/

General Considerations

- Purpose and intent of the agreement
- A precise description of the block of land (cadastral description)
- The price and method of payment
- The parties entering into the agreement and description of legal faculties of institutions and signers
- Provisions for making original agreement with cooperative federations and later passing the obligations to an affiliated cooperative possessing legal charter

On the Eligibility of Candidates

- Guatemalan citizen
- No criminal record nor impediment to exercise full civil rights
- Satisfactory health - no permanent debilitating disease as certified by a physician
- Legally married or established common law union
- Free of debt to public institutions and cooperative, if a member
- Maximum age - 50 years

1/ Source: Excerpted from "Program for Integrated Development of the Northern Transversal Strip", National Economic Planning Council, November 1975.

- Does not possess nor have rights to work more than 5 hectares of cultivable land supporting a single family unit

- No source of income of over $750 per year from sources other than agriculture

- No candidate excluded for reasons of race, ethnic background, political affiliation or religious preference

- GOG reserves right of veto of candidacy but may not impose selection on cooperative

Land Rights

- Block of land sold to the cooperative will be clearly delineated, permanently marked and registered in the cadastral archives of the Nation at no cost to the cooperative

- Land title will be provisional during the first 5 years of the project and unrestricted title rights will be granted to the cooperative at the end of this period if, in the opinion of the GOG the objectives of this agreement are being met

- Cooperative may not sell portions of the block without permission of the GOG

- The cooperative may only grant usufruct rights and only to its members

- Members must declare rights of inheritors upon receiving a parcel of land in usufruct

- The cooperative will maintain title and all rights of lands designated for public services

- Cooperative may rent or lease parcels of land within the block for commerce, artisans and other services provided in benefit to its members

- The cooperative may not collect rent from the GOG for lands required for security or other services provided by the central government

- The cooperative is responsible for all taxes which are normally applied to landholders in Guatemala

- Laws of the nation covering the protection of flora and fauna are fully applicable to the cooperative

- The GOG may declare portions of the block unfit for annual cultivation and may insist upon the establishment of forest preserves, parks or other measures of land use which contribute to the preservation of natural resources

- The cooperative must give rights of access and cede right-of-way for the construction of public roads at no cost to the GOG

- In case of delinquent debts to the GOG, the cooperatives may be required to sell portions of the lands described in this agreement in order to meet obligations

- The cooperative may not acquire additional lands without the permission of the GOG

- The cooperative may charge fees for the use of lands and installations by members or non-members in order to recover the costs of investments

- The appreciation of land values which result from investments made by the cooperative shall accrue to the cooperative and no individual members shall have rights to claim a portion. Land and capital assets of the cooperative shall be accounted for as indivisible net worth (capital irrepartible)

Utilization of the Land

- The cooperative must obtain approval from the GOG for the general design and layout of the utilization of lands within its block before undertaking measurement and assigning of individual parcels to members

- No member will be assigned less than 4 nor more than 15 hectares of land for cultivation for family income

- The cooperative may designate lands for agricultural pursuits under its direct administrative authority

- The cooperative may enter into temporary or short-term agreements with members for the use of lands

Between the Cooperative and Its Members

- The cooperative shall enter into a uniform usufruct agreement with all qualified members assigned to a parcel of land which shall contain the following provisions:

  - Continued use of land guaranteed as long as member follows the rules
  - Improvements to the land are the property of the member
  - Rights to the land and value of improvements as well as debt or other obligations may be left in inheritance
  - Land rights may only be sold to the cooperative or approved member
  - Land rights of parcel may not be subdivided
  - Member may procure labor from any source and may permit persons to establish residence on the parcel who do not enjoy the rights of membership in the cooperative
  - A member may be expelled or removed from an assigned parcel but the cooperative must pay him for improvements
  - A member may lose his rights of usufruct and be required to surrender the value of improvements for non-payment of financial obligations to the cooperative
  - The cooperative may take over all or part of a member parcel for purposes of building access roads or other facilities but must pay member a fair price for improvements
  - Member may rent or lease a portion of his parcel to another members but this does not alter his obligation to the cooperative in any way

- A description of the specific parcel, measurements, location and identification within the block shall be made for each member

- The cooperative may collect monies from its members for the payment of taxes or other obligations to the GOG

- The cooperative may assign levies to be paid in cash or kind to members for purposes of the welfare of the community

- The rights and obligations of members are not transferrable except as the cooperative authorizes or are provided for elsewhere in this agreement

- In the resolution of disputes between members in matters relating to the cooperative (non-criminal issues), the decision of the cooperative is final

- The cooperative may detain members for criminal offenses to be turned over to the proper authorities

- Members are obligated to provide the cooperatives with information regarding the status of the family, agricultural activities or other data required by the cooperative or the GOG

- The cooperative may not interfere with the practice of religion, rights of assembly, use of language, dress nor observance of customs of members nor others living within the block

- The cooperative may not authorize behaviour nor activities which are prohibited by Guatemalan law or decree

Relations with the Government of Guatemala

- The cooperative must permit access to lands, installations and records of operations to the GOG

- The cooperative is required to pay all taxes (arbitrios) and fees normally collected by the GOG except those taxes specifically exempted in cooperative legislation

- The cooperative may be required to become an "agent" of the municipality to which its lands belong and perform services required either by the municipality or by the settlers within its jurisdiction

- The cooperative may request services of the GOG to be provided within the limits of its landholdings

Modifications to This Agreement

- The only valid reasons for cancelling this agreement unilaterally by the GOG are:

  - Bankruptcy or inability of the cooperative to pay obligations owed to the GOG

  - Refusal of the cooperative to take actions in pursuit of the objectives of this agreement

  - Changes in the legal order of the GOG in which this agreement is not compatible

- This agreement may be modified by accord of both parties but in the case of the cooperative, the Board of Directors will represent the cooperative and may request consultation with the General Assembly of the Members before acting on behalf of the cooperative

- The cooperative, as represented by its Board of Directors, may request modifications to this agreement to the GOG

- The terms of this agreement which are in contradiction to subsequent legislation in cooperatives, public lands and other matters relating to the cooperative and its relationships to the GOG, may be modified to be in accord with such legislation

San Antonio Las Cuevas - Vertice de Santiago Road

Rationale & Overall Objectives

Several objectives and alternatives of major access to the colonization area have been considered. Because of limited funds, consequences of recent oil finds in the Ixcán, and a recent update of an Economic Study for major highways*, comparisons of route alternatives and their objectives were considered paramount of project planning were to be held consistent with the overall development plan for the Transversal area.

The Planning components considered were:

1. The road placement from Sebol to the highland area, principally through Barillas. The suggested alignment** referred to as the "San Antonio" alignment, would connect the eastern lowlands of Rubelsanto*** and thence to Barillas in the Western highlands.

2. The Shenandoah Oil Co. presently drilling the Ixcán, has scheduled all-weather penetration roads towards the Ixcán colonization area. These roads may parallel each other, providing a rather unique opportunity to combine the road alignments for a single multi-objective road.

3. The access for Ixcán colonizers to a reasonably large market for both surplus production and necessary farm inputs.

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* Economic Feasibility Study for Four Northern Highways. Louis Berger, Inc., for the Consejo Nacional de Planificación Económica (financed by USAID).

** IDID.

*** The Shenandoah Oil Company has constructed 30-40 Kms. of all weather roads leading back to Sebol, which in turn is connected to Guatemala City (via Cobán) by excellent highways.

The objectives, clearly, are dissimilar but will be coordinated to satisfy all interests.

The first objective, to meet planning requirements for the Highway grid system, is probably the most flexible with regards to slight departures of alignment. Second, Shenandoah Oil has agreed to assist, where feasible, to maintain a general alignment meeting the first objectives; and third, the absolute need for the Ixcán ingress/egress to the area must be met. At this juncture, there are two alignments which would meet that need. The easterly decent from Barillas to Ixcán, an expensive alternative because of the mountainous terrain, and the westerly alternative from Rubelsanto to Ixcán, a less costly alternative due to the rolling terrain.

In 1968, the Louis Berger Report captioned the following:

In order that the San Antonio Las Cuevas-Vértice de Santiago Highway be a viable economic project, it is necessary that a connecting road be constructed from the central highland region to the northwestern lowland region. This connecting road would provide access so that surplus agricultural production could be transported to deficit markets in the highlands. Also, the connecting road would allow people from the more densely populated highlands to settle in the unpopulated northern lowlands.

While it is impossible to determine the proper location of the connecting road without further economic and engineering studies,* nevertheless a few observations by the Consultant are indicated at this time:

(1) Because of extremely mountainous terrain surrounding the northwestern lowlands, physical features limit the number of possible alternatives for the connecting highway. Based on the Consultant's study and experience in the region, only three possible routes appear feasible from an engineering point of view. These are:

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* Those studies have since been completed. It provided several viable alignment alternatives.

Alternative No. 1 - Connection between Ojo de Agua and Barillas: This alternative leaves the San Antonio Las Cuevas - Vertice de Santiago highway at Km. 151, Ojo de Agua, with an altitude of 740 meters, and ascends through the mountainous region to Barillas with an altitude of 1450 meters. The length of the connection is 28 kilometers. From Barillas an existing narrow road of approximately 100 kilometers winds its way through the mountains to the city of Huehuetenango with its connection to the Pan American Highway.

Alternative No. 2 - Connection between Rio Ixcán and Barillas: This alternative starts from the project highway at the Ixcán river, Km. 134, with an altitude of 320 meters. The route follows the edge of the river to an altitude of 400 meters and then climbs to Barillas. The length of the connection is 28 kilometers and the ascent is considerably steeper than Alternative No. 1.

Alternative No. 3 - Connection between Valle de Candelaria and Nebaj: Starting from the Valle de Candelaria at Km. 124 of the project highway (altitude 300 m.) the route passes through the Xaclbal River canyon and follows the river to Nebaj (altitude 1907 m.). The length of this connection is 55 kilometers. Providing it is technically feasible to construct a road through the Xaclbal River canyon, this route would have the lowest grades of all three alternatives. At Nebaj, a gravel surfaced road leads to Huehuetenango (70 kilometers) and Santa Cruz del Quiché (57 kilometers).

(2) From the point of view of the San Antonio Las Cuevas - Vértice de Santiago Highway, the connection which provides the optimum return would be the one which connects most directly to the Ixcán lowland region. From the Ixcán lowlands, passing San Ramón to Ojo de Agua, approximately 17 kilometers, the economic benefits per kilometer are estimated to be about 36,000 discounted at 12 percent. For this region the present worth of construction costs per kilometer are estimated to be 100,000, far outweighing the benefits. Costs outweigh benefits because this section ascends an extremely mountainous region.

(3) The choice of the connecting alternative has to take into consideration not only the new stretch of highway to be constructed, but also the overall route to the central highlands. User costs studies would have to be made of the alternative routes as well as construction cost estimates of improving any deficiencies in existing proposed connecting routes.

As one may surmise, the emphasis on the Barillas direction (from Ixcán) is not only costly, but held its objective to provide an expanding road network in the mountains to promote the major overall feasibility of the "San Antonio" road. The departure taken in this analysis, suggests that eventually all objectives and planning criteria will be met, but may lag in the timeframe anticipated earlier.

Presently, the Department of Public Works (Caminos) has reviewed the San Antonio Las Cuevas-Vértice de Santiago Road Study, and are contemplating final design and construction within the near future. The coincidence of this road alignment with our proposed settlement area affords us the opportunity to coordinate stage construction of the "San Antonio" road and utilize that investment toward the settlement program. More specifically, it is recommended that a portion of the San Antonio road alignment be utilized as the major access road which could ultimately be upgraded to trunk highway standards when that project matures. In short, the lesser geometric design for the present low-volume access road would amount to a premature investment by the GOG.

From a more technical point of view, there are particular advantages to using the San Antonio alignment and the Rubelsanto Easterly approach.

1. The 1984 traffic projections suggest that the San Antonio road will carry 45 vehicles per day of which 58% will be 5-ton trucks or greater. This implies that road sections of a low-volume nature, perhaps four meters wide, with turnouts, is the maximum that is justified in the early stage of development. In consequence, however, one-lane truck traffic loads require a rather substantial structural zone with heavy maintenance costs. Assuming the Shenandoah Oil Company uses this alignment for hauling their equipment, additional construction as well as maintenance efforts will be required. The study concludes,

that initially bank run surface material (gravel) be used, which later, when reconstruction is economically warranted, will be used as the sub-base for the new upgraded road. Costs associated with this stage construction were estimated at the rate of $20,000 per kilometer (1968 prices) for rolling and hilly terrain. By recent calculations, 1968 prices would translate to roughly $38,000/Km. at 1975 prices. However, since the section for the Ixcán project would not be over 5 meters wide (as compared to the ultimate design at 7 meters) and at least 8" under the ultimate final grade elevation, the construction costs were reduced proportionately. All other criteria, such as curvature and grade would be met. Costs to meet this level of construction would lie in the order of roughly $20,000/Km. The total amount would approach $600,000 plus a ferry system to cross Rio Chixoy amounting to an additional $45,000. Of course, the lesser access roads would cost substantially less, in the order of $7500/Km.

As an aside, the recommended STOL airfields will be located along the Ixcán road alignment in proximity to "wide spots" in the roadway. The importance of the STOL strips, lies in the early access to the colonization area in view of the 18-month construction time estimated for the major Ixcán access road. All airfields are designed with short take off and landing criteria and would not exceed 300 meters. By nature the STOL strips would be short lived, dirt or grass in surface, sufficient for early access of engineers and surveyors who will establish the settlement parcels and boundaries. By necessity, construction will be purely labor intensive since access to equipment will not be available.

Economic Analysis for the San Antonio Road

The development of rural roads in a region where traffic demand is expected to increase over time can normally be accomplished most economically by the technique of stage construction, i.e., progressive improvements in road quality and capacity over time, beginning from some relatively low standard. This process enables successive upgrading investments to be made at later points in time, rather than spending a large amount initially to construct the road to its ultimate standard.

Where capital is scarce, as reflected by a high interest rate, or opportunity cost of capital, this

postponement of investments becomes particularly advantageous, as the discounted value of an investment made at a future point in time is less (numerically) than the same investment made at the present time. Because of this, net savings may accrue from stage construction even though the total amount spent to reach the ultimate standard may be more than for a single initial operation (due to additional mobilization costs, etc.).

On the other hand, any savings derived from the deferent of capital investment is somewhat offset by the fact that road user costs and road maintenance costs are generally higher for the lower standards of road. However, if traffic growth begins from a low base, such as the San Antonio road, the importance of these costs will be diminished in the earlier periods of the staging process.

Thus, it can be seen that a situation in which traffic is expected to increase from a low initial level, and in which the opportunity cost of capital is relatively high, leads itself most readily to the advantages of stage construction. This is precisely the situation prevailing in the Ixcán colonization project; hence, stage construction is an economically efficient technique.

Selection of the most economical timing of sequential upgradings require an analytical process which will weigh the various upgrading costs against the maintenance and road user costs associated with each stage, taking into account the appropriate interest rate at which to discount future costs. This approach presents a simplified cost minimization model for accomplishing the task.

The outcome of the analysis* suggests that the first stage under this project will provide a benefit/Cost ratio of 1.39. The critical assumptions are: A 15% discounting feature approximating the opportunity cost of capital. The timing for additional upgrading of the road occur in 1983. This implies that the economic service life of the road exceeds 17 years.

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* Annex contains a full description of the analytical process. M.C. Demetre, July 1975.

By updating the 1968 Louis Berger user costs, the specific 1978 road user costs were ascertained for the various road surfaces. Establishing initial traffic on the San Antonio road into the colonization site as 13 vehicles per day was determined through a mix of trucks servicing the oil drilling infrastructure and settlement area. A 12 vehicle per day per year growth was extrapolated to meet the 1989 vehicle prediction. Initial construction costs amounting to $600,000 for 30 kilometers and maintenance of $300/Km/year amounting to $9,000/year was utilized as the initial base for future upgrading. The assumption of an economic road life of 5 years was then tested with regards to the model solution of (t_1 and t_2) the time to construct phase II and III.

The economic values derived for users costs on the three stages of upgrading are illustrated in Table I.

TABLE 1

User Costs for Roads of Various Surfaces

	Paved Road Surface			
	Auto	Light Truck	Heavy Truck	Bus
Economic User Costs	0.0835	0.0909	0.1756	0.2245
	Improved Road Surface			
	Auto	Light Truck	Heavy Truck	Bus
Economic User Costs	0.1026	0.1119	0.2265	0.2882
	Unimproved Road Surface			
	Auto	Light Truck	Heavy Truck	Bus
Economic User Costs	0.1197	0.1283	0.2977	0.3916

The "Berger Study" identified a traffic configuration of 58% heavy trucks, 22% light trucks, 10% passenger, and 10% buses for the first two stages. Combining the traffic mix proportionately provides an average weighted traffic mix as shown in Table II.

TABLE II

AVERAGE ECONOMIC USER COSTS FOR TWO-STAGE ROAD

	Auto (10%)	L.T. (22%)	H.T. (58%)	Bus (10%)	Weighted Average Total
Unimproved	0.0937	0.2062	0.5436	0.0937	0.2343
Improved	0.0729	0.1604	0.4229	0.0729	0.1823
Paved	0.0160	0.1264	0.3332	0.0160	0.1229

Assuming that 20% of the stage construction of prior construction is equivalent to a salvage value, and that, generally, the type I_b class road represents the first stage construction, the combination of the maintenance and vehicle cost functions are determined for each upgrading.

MAINTENANCE COST FUNCTIONS * $/km

		1968 Prices	1975 Prices	% Change (ADT)
(M_e) unimproved Type I_b	=	144.46	216.69	2.27
(M_g) improved "	=	188.79	283.18	0.42
(M_p) paved (DBST) "	=	254.69	382.04	0.32

$$M_e = 217 + 2.27V$$
$$M_g = 283 + 0.42V$$
$$M_p = 382 + 0.32V$$

* IBID Louis Berger Study

The operating weighted average costs as derived in Table II were converted to annual costs based upon a 365 day year. Therefore, recalling that the vehicle projections were 13 vehicles/day and vehicle growth to 1989 was determined to be 12 vehicles per day per year the constants for a and b are:

$$\begin{aligned} \text{Earth } M_1 &= 217 + 2.27V \\ O_1 &= 85.5V \\ (M_1+O_1) &= 217 + 87.8V \text{ (and } V = 13 + 12t_1) \\ & \underline{217 + 87.8\,(13 + 12t_1)} \\ & 1358 + 1054\,t \text{ (ie } a + bt) \end{aligned}$$

Simultaneously then, the remaining constants are:

$a_1 = 1358$ $\quad a_2 = 1153$ $\quad a_3 = 965$
$b_1 = 1054$ $\quad b_2 = 803$ $\quad b_3 = 542$

Solving for t_1 and t_2:

$$t_1 = \frac{rC_{12} - (a_1 - a_2)}{(b_1 - b_2)}$$

$$= \frac{0.15\,(15{,}500) - (205)}{251}$$

$$t_1 = \underline{\underline{8.4 \text{ years}}} \text{ (year 1983)}$$

$$t_2 = \frac{rC_{23} - (a_2 - a_3)}{(b_2 - b_3)}$$

$$t_2 = \underline{\underline{17.6 \text{ years}}} \text{ (year 1992)}$$

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* Stage 1 = $32,500; Stage 2 = $48,000; Stage 3 = $80,000 for earth, bank run gravel and DBST respectively.

The Benefit-Cost Aspects

In conclusion, the present worth of all road costs to year 1992 are discounted at 15% (the opportunity cost of capital) and compared to the development aspects of the settlement area.

The total discounted investment cost amounts to $29,284 per kilometer.

The Benefits

Based upon the undiscounted economic benefit stream, illustrated in the farm budget, the average benefit can be developed over the 17.6 year road investment on a kilometer basis. This rather conservative approach, excludes linkages to outlying farmers, who also benefit but do not have direct access to a primary road market.* Obviously, those more distant farmers will incur additional transport costs, increasing proportionately as their distance from the major road network.

Assuming that an average 8 ha. farm would lie adjacent to each side of the road, and that 5.7 farms benefit directly per Km. of road, the total discounted benefits accruing over 17.6 years would amount to $40,603 per Km. of project influence.

In conclusion, the average discounted benefit cost per kilometer would exceed 1.39.

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* The total beneficiaries include not only the project settlers, but the total inhabitants within the zone of influence. The road project has an unusual mix of beneficiaries which include both the farming and petroeloum exploration interests. Since the mix is unknown, a conservative approach was taken, excluding the traffic generated by the petroleoum industry.

LIST OF PROJECTS FOR RURAL ROAD PROGRAM

Highlands Region

		KMS
1.	San Mateo Ixtatán - Ixhuitz (Huehuetenango)	18
2.	Nentón-Delicias-La Unión (Huehuetenango)	15
3.	Carretera (Nentón-La Democracia) - Santa Ana Huista - Pelatán - Concepción (Huehuetenango)	26
4.	San Rafael Petzel - Santiago - Chimaltenango (Huehuetenango)	20
5.*	San Juan Atitlán - (San Rafael Petzal)	4
6.*	San Gaspar Ixchil - 7W (Huehuetenango)	5
7.	Tejutla - Comitancillo (San Marcos)	8
8.	Sibanal - (Carretera Norte-Este) (San Marcos 2)	7
9.*	Todos Santos Cuchumatán - San Martín Cuchumatán	10
10.	Palo Gordo - San Cristóbal Cucho (San Marcos)	7
11.*	Ruta Nac. 15 - Santa María (El Quiché)	10
12.	Rancho de Teja - San Bartolomé Jocotenango - Chinantón (El Quiché)	35
13.*	Santa María Chiquimula - San Antonio Ilotenango (El Quiché - Totonicapán)	20
14.	Cantón Chicajanojo - Patzité - Tzanixnam (El Quiché - Totonicapán)	20
15.*	Agua Caliente - Comalapa (Chimaltenango)	3
16.	Santa María Visitación - CA-1 (Sololá)	20
17.	San Pedro La Laguna - San Pablo La Laguna - San Marcos La Laguna (Sololá)	11
18.	Santa Clara La Laguna - San Juan La Laguna (Sololá)	9
19.*	San Andrés Itzapa - Xeparquiy (Chimaltenango)	4
20.*	San Martín Jilotepeque - Patzaj (Chimaltenango)	20
21.	Chichicastenango - Saquiyá (El Quiché)	7
22.	Ruta Nac. 15 (Camanibal) - Xabiyaguaca (El Quiché)	7
23.*	Río Blanco - San Lorenzo (San Marcos)	7
24.	Tejutla - Sipacapa	25
25.*	Sipacapa - Malacatancito (CA-1)	20
26.*	Tejutla - San Miguel Ixtahuacán (San Marcos)	23
27.	San Antonio Sacatepéquez - Río Blanco - Cabricán (San Marcos)	25
28.*	San Pedro Jocopilas - San Bartolomé Jocotenango	22
29.	Santa Cruz del Quiché - Santa Rosa Chujuyub (Quiché)	25
30.	San Martín Jilotepeque - Mixco Viejo	15
31.	Santa Bárbara - Chicol	20

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* Roads selected as per Selection Criteria for financial and economic analysis.

		KMS
32.*	San Bartolo - Pologua	12
33.	Chinantón - San Andrés Sajcabajá - Aguas Calientes	10
34.*	Ixchiguán - San José Ojetenán	12
		502

Eastern Region

1.*	Quesada - Santa Gertrudis (Jutiapa)	20
2.*	Comapa - San José (Jutiapa)	2
3.*	Jalpatagua - El Zapote - San José (Jutiapa)	20
4.*	Jutiapa - Lomitas	8
5.*	El Progreso - Apantes	5
6.*	Atescatempa - Los Cerros	4
7.*	Jerez - El Pinal	8
8.	Santa Catarina Mita - El Quebracho - Corral Falso	10
9.*	Platanar - Agua Blanca	15
10.*	San Pedro Pinula - El Sunzo	15
11.	Esquipulas - El Carrizal	25
12.*	El Carrizal - Pasaljá	15
13.	Esquipulas - San Isidro	15
14.	Ruta Nac. 16 - Santa María Ixhuatán - Chuchuapa	18
15.	Camotán - Marimba - Ocumblá	10
		190

Northern Lowlands

1.	Cobán - San Juan Chamelco	8
2.	San Pedro Carchá - San Vicente (Alta Verapaz)	32
3.	Santa Cruz Verapaz - Sabob - Candelaria Segundo	30
4.	San Juan Cotzal - Putul	25
		95

Central Region

1.*	CA-14 - Santa Cruz (Baja Verapaz)	15
2.*	San Gabriel (Ruta Nac. 5) (Baja Verapaz)	6
3.	Rabinal - Vegas Santo Domingo - Patixtlán - La Laguna	15
4.*	La Unión - Pinalito	7
5.	La Unión - El Tesoro - Morolá	15
6.	El Tesoro - Shupá	12
		70

LIST GRAND TOTAL 857 Kms.

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* Roads selected as per Selection Criteria for financial and economic analysis.

The sum of all the roads from the above list which have been selected by the GOG project committee for detailed economic and financial analysis absed on the Selection Criteria is:

Highlands	172 Kms.
Eastern	112 Kms.
Central	28 Kms.
Total	312 Kms.

After completion of analyses and following consultation with IDB it is estimated that 280 Kms. will be eligible for financing under this project.

MINISTERIO DE
INANZAS PUBLICAS

GUATEMALA C A

Solución 2198

Registro

Guatemala, 4 de diciembre de 1975

UNCLASSIFIED
ANNEX B
Page 1 of 2

Señor Edward W. Coy
Director de la Misión AID
Embajada de los Estados Unidos
C i u d a d.

Estimado señor Director:

Como resultado de las conversaciones y correspondencia sostenidas durante el corriente año entre la Agencia a su digno cargo y las diversas instituciones del sector público agrícola del Estado, por medio de la presente tengo el gusto de presentar a usted solicitud formal en nombre del Gobierno de la República de Guatemala de un préstamo y de ayuda, en concepto de donación, para llevar a cabo el programa de desarrollo rural. La asistencia solicitada servirá específicamente para complementar los esfuerzos del Gobierno en la expansión y mejoramiento del programa de desarrollo rural incluido en el Plan de Desarrollo 1975-79, dando especial énfasis a aquellas actividades relacionadas con el mejoramiento de las condiciones de vida de los compesinos de escasos recursos en las áreas rurales del país.

El Consejo Nacional de Planficación Económica, en estrecha colaboración con las instituciones del sector público, ha planificado diversas actividades a ser llevadas a cabo durante los próximos cinco años, que ofrecen grandes posibilidades de mejorar el nivel de vida de los habitantes del área rural, especialmente en la zona del altiplano. A continuación enumeramos los puntos sobresalientes del programa para el que estamos solicitando asistencia:

1) Colonización de la faja transversal norte por familias seleccionadas entre los habitantes de pocos recursos del área rural;

2) Mejoramiento y construcción de caminos de acceso de especificación mínimas, utilizando mano de obra intensiva, en las regiones del altiplano y suroriente;

3) El desarrollo de actividades para el mejoramiento de suelos que incremente la productividad del terreno y ayude a la conservación de los recursos naturales de la región del altiplano, dando preferente importancia a las actividades de mini-riego y prácticas de consevación de suelos;

4) Mejoramiento de los recursos humanos que integran las instituciones del sector público agrícola, aumentando su capacidad en cuanto a planificación, análisis y programación se refiere.

MINISTERIO DE
FINANZAS PUBLICAS

GUATEMALA, C. A.

Resolución 2198

Registro

UNCLASSIFIED
ANNEX B
Page 2 of 2

Señor Edward W. Coy

4/12/75

Al presente estimamos que para llevar a cabo las actividades del proyecto, en un período de cinco años, se precisa de un préstamo por la suma de US$13,000,000.oo. Además, durante el período de desembolso del préstamo, el Gobierno espera desarrollar la capacidad técnica y administrativa necesarias para continuar dichas actividades de allí en adelante. Para implementar y apoyar las actividades que en el proyecto se contemplan, deseamos solicitar ayuda, en forma de donación, para cubrir el costo de asistencia técnica que contribuirá al mejoramiento del programa y de su ejecución, y que será además muy beneficiosa para que las cooperativas puedan llevar a cabo el proyecto de colonización. Será igualmente valiosa a las instituciones del sector público agrícola para llevar a cabo los planes y ejecución de los sub-proyectos de miniriego y conservación de suelos, así como para reforzar la unidad de planificación del sector, para que ésta pueda jugar un papel determinante en el adiestramiento, coordinación, planificación y programación de todas las actividades bajo su directo control; a tal fin, el Gobierno de la República se compromete a aportar una suma no inferior a Q 6,000,000.oo durante la ejecución del proyecto.

Creemos que tanto la legislación como la base institucional existentes, son adecuadas para llevar adelante las varias fases que conforman el programa. Sin embargo, en lo que se refiere al sub-proyecto de colonización, creemos conveniente mencionar que el Ejecutivo considerará las necesarias modificaciones a las instituciones del sector público agrícola directamente responsables de las actividades relacionadas con la colonización de tierras, a efecto de superar cualesquiera limitaciones en este campo de acción. Consideramos que tales modificaciones complementarían nuestra actual legislación sobre colonización, lo que permitiría su financiamiento dentro del préstamo que estamos solicitando.

Esperando que la Agencia bajo su digna dirección dé a esta solicitud su más pronta y favorable consideración, a efecto de que el proyecto pueda iniciarse a la mayor brevedad, aprovechamos la oportunidad para suscribirnos del señor Director, con toda estimación, muy atentos y seguros servidores.

LIC. JORGE LAMPORT RODIL
MINISTRO DE FINANZAS

MINISTERIO DE FINANZAS PUBLICAS
GUATEMALA, C. A.
AMERICA CENTRAL

cc: Sr. Ministro de Agricultura

JLS/

CERTIFICATION PURSUANT TO SECTION 611(e) OF THE FOREIGN ASSISTANCE ACT OF 1961, AS AMENDED

I, Edward W. Coy, the principal officer of the Agency for International Development in Guatemala, having taken into account, among other things, the maintenance and utilization of projects in Guatemala previously financed or assisted by the United States, do hereby certify that in my judgment Guatemala has both the financial capacity and the human resources capability to effectively utilize and maintain the facilities and equipment provided as part of this capital assistance project, Small Farmer Development Loan.

This judgment is based upon the improving implementation record of AID-financed projects in Guatemala and the quality of the planning which has gone into this new project.

(signed) Edward W. Coy

(date) Dec 5, 1975

"ANNEX"

LOAN AUTHORIZATION

Provided from: Alliance for Progress Funds
GUATEMALA: Small Farmer Development Loan

Pursuant to the authority vested in the Deputy U.S. Coordinator, Alliance for Progress, Agency for International Development ("A.I.D."), by the Foreign Assistance Act of 1961, as amended, and the delegations of authority issued thereunder, I hereby authorize the establishment of a loan ("Loan") pursuant to Part I, Chapter 2, Title VI of said Act to the Government of Guatemala ("Borrower") of not to exceed THIRTEEN MILLION United States dollars ($13,000,000) to assist in financing United States dollar and Central American Common Market local currency costs to carry out a program for small farmer development - including increasing the productive capacity of land resources, opening new lands for settlement, constructing access roads and strengthening public agricultural sector organizations ("Project"). The Loan shall be subject to the following terms and conditions:

1. Interest and Terms of Repayment:

Borrower shall repay the Loan to A.I.D. in United States dollars within forty (40) years from the date of the first disbursement under the Loan, including a grace period of not to exceed ten (10) years. Borrower shall pay to A.I.D. in United States dollars on the disbursed balance of the loan interest at the rate of two percent (2%) per annum during the grace period and three percent (3%) per annum thereafter.

2. Source and Origin:

Goods, services (excluding ocean shipping) and marine insurance financed under the Loan shall have their source and origin in countries which are members of the Central American Common Market or in countries included in Code 941 of the A.I.D. Geographic Code Book. Marine insurance may be financed under the Loan only if it is obtained on a competitive basis and any claims thereunder are payable in freely convertible currencies. Ocean shipping financed under the Loan

shall be procured in any country included in Code 941 of the A.I.D. Geographic Code Book, excluding countries which are members of the Central American Common Market.

3. Local Currency:

United States dollars utilized under the Loan to finance authorized local currency costs shall be made available pursuant to procedures satisfactory to A.I.D.

4. Other Terms and Conditions:

(a) Prior to the first disbursement of Loan funds or issuance of commitment documents, the Borrower shall submit in form and substance satisfactory to A.I.D.:

(i) Evidence that Borrower has designated an overall Project Coordinator.

(ii) Evidence that the Borrower has appointed a Project Implementation Committee chaired by the Project Coordinator.

(iii) Evidence that Borrower has entered into contracts previously approved by AID for consulting engineering services.

(iv) Evidence that the Borrower has made arrangements satisfactory to AID to obtain other technical services.

(b) Prior to the first disbursement of Loan funds or issuance of commitment documents for other than technical assistance, Borrower shall, except as AID may otherwise agree in writing, submit in form and substance satisfactory to AID:

(i) A program staffing plan which includes the agricultural sector planning unit and the organizational entities responsible for land resources improvements, access road construction, new lands settlement and human resources development.

(ii) A detailed Financial Plan evidencing the annual GOV counterpart contributions which will be made to support the Project.

(iii) A detailed time-phased Implementation Plan covering all activities to be completed during the life of the Project.

(c) Conditions Precedent to Disbursements for Land Settlement Activity

Prior to any disbursement or to the issuance of any Letter of Commitment other than for Consulting Services for the Land Settlement Activity, the Borrower shall, except as AID may otherwise agree in writing, furnish to AID in form and substance satisfactory to AID:

Evidence that procedures and terms governing the transfer of blocks of Government land to cooperative Federations or cooperative groups have been promulgated.

5. Except as AID may otherwise agree in writing, Borrower shall covenant with AID that it will:

(a) Provide and utilize for the Project financial and other resources compatible with the Plan attached as Annex II to this Loan Agreement.

(b) Adequately maintain all roads constructed under this Loan.

(c) At the end of the Project's fourth year, provide AID with its plan for continuing the expansion of the Northern Transversal Strip land settlement program beyond the disbursement period of the Loan.

6. The Loan will be subject to such other terms and conditions as AID may deem advisable.

ANNEX E - OUTLINE

Supplementary Annexes

Exhibit 1	Evaluation of Prior AID Assistance
Exhibit 2	Framework for Analysis and Planning of New Lands Settlement for the Franja Transversal
Exhibit 3	Livestock Enterprise Data
Exhibit 4	Minifundia Problem and Man/Land Ratios for Small Farms in Guatemala
Exhibit 5	Guatemala Crop Profitability Analysis
Exhibit 6	A Proposed Plan for Short and Long Term Pre- and In-Service Training for Guatemala Agricultural Public Sector Personnel - 1976-1980
Exhibit 7	PREALC (UN) Labor Intensive Road Construction Organization Proposal
Exhibit 8	Potential Benefit/Costs of "Mini-Riego"
Exhibit 9	Participant Training Program Under Loan 520-L-018
Exhibit 10	DAEC Approval Messages
Exhibit 11	Stage Analysis of San Antonio Road
Exhibit 12	Labor Intensivity and Access Road Construction
Exhibit 13	Logical Framework
Exhibit 14	Draft Project Description
Exhibit 15	Statutory Criteria

EVALUATION OF PRIOR ASSISTANCE - SUMMARY 1/

A. AID Assistance to GOG Agricultural Development Programs

AID and predecessor agencies provided grant and loan assistance primarily for the commercial agriculture sub-sector during the 1950's and 1960's. Much of this assistance went for highway construction and colonization activities on the South Coast as well as for credit and technology development for rubber, kenaf and other export crops. An integrated and comprehensive AID assistance program for the development of the Guatemalan traditional agricultural sector was initiated in 1970 with the approval of a $23 million loan to assist the GOG in financing a portion of the $143 million Guatemalan Agricultural Development Plan for 1971/75. 2/ In 1973, another loan for $4.5 million was approved for credit to two cooperative federations and a small farmer assistance foundation for sub-loans to small farmers for production and marketing purposes.3/

Complementary AID grant funded assistance for activities in production, marketing, human resources and institutional development approximated $1 million per year for the 1971/75 period.

AID loan assistance was primarily to supplement GOG resources for financing operating and capital budgets of reorganized public agriculture sector institutions charged with implementing the Rural Development Program, and for financing capital requirements of small farmer production credit programs in basic grains and diversified crops. $2.0 million of the 018 loan and the entire $4.5 million of the 024 loan were reloaned to two cooperative federations 4/ and the Penny Foundation for production credit sub-loans to small farmer members.

1/ The detailed Evaluation Report, prepared by Dr. Fred Mann was completed in October, 1975 and is available in the USAID files.
2/ Loan No. 520-L-018, Capital Assistance Paper AID-DLC/P-881,I/23/70.
3/ Loan No. 520-L-024, Capital Assistance Paper AID-DLC/P-1083, II/21/73.
4/ FENACOAC-Federación Nacional de Cooperativas de Ahorro y Crédito y FECOAR-Federación de Cooperativas Agrícolas Regionales.

1. Purposes of AID Assistance

The purposes of AID assistance were a) to stimulate agricultural public sector institutional reform and development, and cooperative institutional development and expansion, 2) to improve technology levels in agriculture through increased public investment in research, extension, training and small farmer production and grain storage credit, and 3) to expand public assistance to artisans through credit, technical assistance and marketing.

2. Magnitudes of Inputs and Expected Impacts by Purpose

Loan inputs (018 and 024) by purposes were programmed for the 1971/75 period as follows:

PURPOSE	INPUTS (000's $)		EXPECTED IMPACTS
	AID	GOG	
1. Small Farmer Production and Storage Credit			
a. BANDESA/DIGESA (Production Credit)	11,609.0	10,103.1	Provide annual production credit for 60,000 hectares of basic grains and diversified crops by 1974.
b. BANDESA/DIGESA (Storage Credit)	2,530.0	2,530.0	Finance construction and inventory of 54,000 TM for private grain storage over 5 years.

PURPOSE	INPUTS(000's $)		EXPECTED IMPACTS
	AID	GOG	
c. Cooperative Production Credit			
(1) Loan 018	2,000		Provide credit for sub-loans to 125-150 agr. coops.
(2) Loan 024	4,500	500.0	Sub-loans to small farmer coop members for production.
d. Technical Assistance (Operating Costs)	2,705.5	5,058.5	Provide support for operating costs for agr. public sector reorganization and technical assistance to small farmers.
2. Artisanry			
a. Credit	600.0	25.0	Assist 2,000 artisans to increase annual income by $100-$200 each, over 5 year period.
b. Tech. Assist. (Operating Budget Support)	150.0	477.6	
3. Production Research (Operating Costs)	1/	1/	Develop effective small farmer technology research programs.

1/ Included in 1.d.

PURPOSE	INPUTS(000's $)		EXPECTED IMPACTS
	AID	GOG	
4. Human Resources Dev. - Operating Budget support and construction	3,570.5	3,320.1	Train 50,000 farm youth; 86,000 farmers; 1,000 peritcs agronomos; 3,185 teachers and change agents and 125 university students.
5. Grain Marketing (Technical Assistance)	375.0	375.0	Provide technical assistance for private grain storage development.
TOTALS	27,500.0	22,389.3	

Grant assistance for the 1971/75 period was approximately $2.7 million to complement the basic grains and diversified crops research, production and storage programs, and another $2.3 million to strengthen agricultural cooperatives, through operating and capital budget support.

B. Sector Accomplishments for the 1971/75 period.

1. Institutional Reorganization and Development

A reorganization of the public agricultural sector was accomplished in which all public agricultural sector agencies were brought by law under the policy control and coordination of

the Minister of Agriculture. Present organization unifies related functions in institutions within the public agricultural sector as follows:

a. BANDESA - all public agriculture-related credit activities.

b. INDECA - all public activities related to agricultural marketing and processing.

c. ICTA - all agricultural production research related activities.

d. DIGESA - all agricultural extension and services activities.

e. INTA - all land tenure related activities.

f. INAFOR - all forestry development and use activities.

2. BANDESA/DIGESA Agricultural Production Credit and Technical Assistance Program

a. Increased program levels

During the loan period, the number of technical assistance agents assigned to work directly with farmers increased from 94 to 450. While in 1971, only about 2,000 small farmers received production credit for basic grains and diversified crops, this number increased to nearly 14,000 in 1974. The amount of money loaned increased from $4.3 million to $26.4 million during the same period. Cumulatively, from 1971 through July, 1975, approximately 25,000 production credit loans were made for a total volume of $43 million.

During this same period, nearly 76,000 farmer/participants received training through mobile schools (19,000)

at training centers (12,000, and through direct contact with GOG extension agents (45,000). In addition, 43 public agricultural sector employees received advanced training in the U.S. and third countries.

b. Impact of Credit and Technical Assistance on Farmer Borrowers

A sample survey of 1,600 small farmers was carried out in 1974 and analyzed by LA/DR/SA to determine the impact of credit and technical assistance on small farmers. LA/DR/SA reported the major findings of the study as follows:

a. The impact of credit on production appears to have been significant in all farm sizes and in all regions.

b. For all farms, at the national level, total output superiority of credit over non-credit farms is mainly due to increased area per farm (due largely to expanded rental of land and a higher proportion of total farm area in crops on credit farms as compared to non-credit farms).

c. Credit is instrumental in bringing idle cropland into production.

d. The data provides strong support for land distribution through use of credit financed rental or purchase.

e. Considering the average for all farms at the national level, crop mix had no impact on increased output, and yield had a slight negative effect, on credit farms as compared to non-credit farms. On the smallest farms, differences in crop mix is the major explanatory factor for credit farm output superiority over non-credit farms. The data and analysis suggest that there should be a shift in crop

composition on the small farms from corn and wheat to higher value crops. Such a change is essential to significant long run increases in employment and income.

f. It appears that linking credit to technical assistance provides no advantage over technical assistance or credit alone.

g. Credit appears to have had a significant positive impact on employment since credit farms in all size classes utilize more labor per hectare in the farm, and have more area per farm than do non-credit farms. This increased labor is not due to increased labor use for a given crop. On smaller credit farms, more labor is used per hectare due largely to the more labor intensive crop mix as compared with larger credit farms and non-credit farms.

h. Small farmers produce more per scarce resource unit and their output response to credit is greater than that of the larger farms. The extreme poverty of small farmers is not due to the inefficiency of their production processes but rather to the absolute small size of their farm business.

5. <u>Cooperatives Agricultural Credit Program</u>

The 1975 ATAC Cooperative Institutional Evaluation concludes that, in general, the goals and purposes of AID assistance over the 1971/75 period have been achieved in most instances, and significantly exceeded in some.

The entire 12.0 million from Loan [illegible] allocated to cooperative federations and the Henry Foundation), and the $4.5 million from DSI, has been disbursed or liquidated in its entirety. Additionally, approximately [illegible] million of the small farmer production credit portion of Loan [illegible] has been channelled through independent cooperatives or groups.

The GOG has contributed approximately $2.5 million to BANDESA for loans to cooperatives for small farmer production, and grant assistance to small farmer cooperatives has reached $3.0 million by AID and $0.65 million by the GOG during 1971/75.

Credit by cooperatives to small farmers reached nearly $4.0 million in 1974, with loans to approximately 25,000 borrowers. Some 45,000 or about 17% of the small farmers in the Western Highlands are members and receiving some services from cooperatives.

The cooperatives federations (FENACOAC and FECOAR) have been effective not only in providing production credit, but also in supplying fertilizer and, in some cases, marketing services. Some limited technical assistance also is provided, with a few affiliated cooperatives being highly effective in this respect.

4. Human Resources Development Program

By the end of 1974, AID had disbursed $3.[illegible] million of a programmed $4.[illegible] million, and the GOG had contributed $3.9 million of a programmed $4.4 million to this program.

During 1974, the activity levels programmed and executed were as follows:

		Programmed	Executed
1.	4-H Club members assisted	25,000	20,000
2.	DIGESA teams promoting cooperatives	8	8
3.	Cooperatives assisted	32	32
4.	Farmers trained	38,000	20,100

		Programmed	Executed
5.	Training of Ministry personnel	109	38
6.	Extension "Promotores" in training	511	458
7.	Farm women trained	4,400	3,100

Training has, in general, been consistent with program purposes and at adequate levels of magnitude. The institutional structure and personnel growth are consistent with a continuing and expanding program. The Barcena Agricultural Vocational Training Institute is functioning adequately, and expansion plans are being implemented. The six programmed farmer training centers have been constructed and are in operation or are about to begin operations. In 1974, four operating centers offered 110 short courses attended by 3,700 farmers. The seven programmed mobile farmer training schools are operating throughout the country. In 1974 six of these offered 107 courses attended by nearly 3,500 farmers.

The 638 man-months of participant training (43 students) achieved is consistent with original program purposes, as adjusted during the period.

c. Agricultural Research Program

Loan 518 originally allocated research funds to the Research Directorate of DIGESA. In 1973 this Directorate was merged with a newly created Institute for Agricultural Research (ICTA). ICTA began absorbing research functions from DIGESA in 1973 and now carries out the major part of agricultural research.

By the end of 1975, about $1.8 million of AID funds and $4.7 million of GOG funds will have been disbursed for agricultural research concentrated on small farmer production problems. Research is being conducted at five experiment stations, at the farm level under controlled conditions, and on test/demonstration plots of small farmers.

A high proportion of ICTA staff are in long-term participant training, and several foreign professionals are being relied upon in the interim for program design and execution. Considerable linkages have been developed with CIAT and CIMMYT.

6. Grain Storage and Marketing

Approximately $150,000 of a programmed $650,000 of 018 Loan funds have been utilized to provide technical assistance and commodities to INDECA to assist in their grain storage and marketing program. Of the originally programmed $4.95 million of Loan 018 for private sector storage facilities construction credit, approximately $700,000 has been approved for 17 loans with 12,600 M.T. of storage capacity.

One of the major reasons for the limited use of the funds originally programmed for private sector storage credit is that during the period, INDECA undertook substantial public sector storage construction with financing from CABEI, which to a large degree substituted for the proposed private sector storage. USAID has reprogrammed the balance of the grain storage construction credit funds for use in production credit, with roll-overs destined for grain storage as demand requires.

7. Artisanry Development Program

By the end of 1975 AID will have disbursed about $129,000 (the GOG $296,000) for technical assistance support to the Programa Nacional de Desarrollo de la Comunidad (PNDC), mainly for equipment and staff salaries. By September 30,

1975, 609 loans were outstanding for small artisan production and marketing for a total of $326,000.

This program has been below targets mainly due to the inability of PNDC to organize and stabilize personnel adequately to assist cooperative groups to prepare loan requests and production plans. A proposed joint IDB/UNDP program to assist artisanry cooperatives should expand activity in this area. In the meantime, remaining loan funds have been reprogrammed for use in crop production credit, with any increased demand in artisanry credit to be supplied by BANDESA from roll-overs or other sources.

C. Shortfalls and Weaknesses in Program Implementation and Output

Although considerable progress has been made in institutional development, program implementation and impacts on the small farmer target group, there are shortfalls and weaknesses in achieving the goals of AID and the GOG in efforts to develop the small farmer and rural poor segments of the economy. The more important of these are summarized below.

1. Economic Analysis, Planning, Programming, Budgeting, Coordination and Evaluation.

Although the reorganization of the public agricultural sector (PAS) provided the Minister of Agriculture with the authority for policy control over public sector activities, it stopped short of providing him with effective staff mechanisms for exercising that control in a meaningful way.

The Sector Planning Unit was established by executive action as a staff unit of the Minister, empowered to make recommendations to the various institutions of the PAS for coordinating development activities. It has lacked status in the sector and has been largely ineffective. A strong Sector Planning Unit should be established as a staff arm of the

Minister's office, empowered to carry out sector analyses, planning, programming, budgeting, evaluation, information gathering and coordination functions for the PAS.

2. Regionalization of Coordination

Attempts at regional coordination to date have relied upon designating the DIGESA Regional Director as Regional Coordinator. Effective regional coordination requires that regional directors be appointed who are direct staff representatives of the Minister's Office (either as staff of the Sector Planning Unit or direct deputies of the Minister).

3. Ministry of Agriculture Salary Levels

Although limitations on salary levels is a constraint on all PAS institutions in attracting the best qualified management and technical personnel, the problem is most serious in DIGESA and the Sector Planning Unit which are subject to central government ceilings and standards for qualifications and pay scales. Until these two institutions are enabled to offer competitive salaries, they will experience great difficulties in up-grading their capabilities by attracting and holding well-qualified staff.

4. BANDESA/DIGESA Credit and Technical Assistance

a. Delinquency Rate and Interest Rate

During 1975, BANDESA/DIGESA individual borrower delinquency has increased from previous levels of about 25%, to September 30, 1975 levels of 29%. BANDESA's current procedures are not effectively dealing with this problem. At the same time, BANDESA interest rates are highly subsidized (5% on basic grains loans and 8% on other agricultural loans) and cannot offset the high potential uncollectible loan levels or cover loan administration costs. With such a situation, rapid de-

capitalization is inescapable if the GOG does not continue its present policy of annual capital transfers to BANDESA.

Subsidized BANDESA interest rates endanger continued expansion and success of the agricultural cooperative movement. The recent ATAC Cooperative Institutional Evaluation makes the following statement (p.12): "We question the rationale whereby members of independent cooperatives receive loans for basic grains at an annual interest rate of 5% through BANDESA, with BANDESA and DIGESA respectively subsidizing the interest rate and the lending costs. FENACOAC and FECOAR receive no subsidization of their administrative costs in lending, and such costs must be met by their members in such forms as higher interest charges. Further, while they (the federations) have access to AID loan funds at a concessional rate of 3%, BANDESA receives money from the Central Bank at 1%. The resulting penalization of federated cooperatives and their members appears inconsistent with public policy and not justified by results achieved".

b. Impact of Credit on Farmer Borrowers

Some of the conclusions reported by LA/DR/SA from the Small Farmer Survey can be misleading unless examined in the context of what the data and supporting analysis can and cannot show, and in terms of further implications of what the data appears to indicate on a crop by crop per hectare basis. The conclusions drawn by the LA/DR/SA report, and summarized above under Section B., 2 "Accomplishments", should be adjusted in terms of the following observations:

(1) Credit cause and effect cannot be determined from the data. Only association of credit with other factors can be shown.

(2) No reliable general conclusions about all small farmers or stratified groups of small farmers in Guatemala can be made based on the data.

(3) There is some indication that BANDESA

credit allows farmers to rent land they otherwise could not rent, thereby expanding their cultivated land base. This also may explain why proportionately more of the land of credit farms is in crops, since rental generally involves only crop land and not associated non-arable land.

(4) B farms have more land (absolutely and porportionately) in diversified crops than do NB farms. However, the data cannot show whether this is a phenomena caused by the credit. Also, farms with significantly higher proportions of cultivated land in diversified crops have higher value of output and higher net incomes per hectare and per man-day worked. This is true whether the farm is a B or NB farm.

(5) No significant difference exists in labor used per hectare by crop on B and NB farms. However, diversified crops use considerably more labor per hectare than basic grain crops. Thus, if credit can assist a farmer to shift from basic grains to diversified crops, it also can be expected to increase employment and income on his farm.

(6) The comparison of net farm income per arable hectare by region and farm size provides no consistent pattern with respect to the relative position of BANDESA farmers and their non-BANDESA counterparts. Of the twenty comparisons in Table 1 below, seven must be disregarded because of lack of data or unreliability due to small sample size, seven show the BANDESA farmers with higher net farm incomes per arable hectare and six show their non-BANDESA counterparts in a better position.

Table 1: Net Income per Hectare of Arable Land by Region, Farm Size and Credit Type (Q. per Hectare)

Size Group	Central Highlands		South Coast (West)		South Coast (East)		Northeast		Southeast Highlands	
	B	NB	B	NB	B	NB	B	NB	B	NB
0-1 ha.	515	172	NA	292*	NA	380*	1,536	344	423*	193*
1-3 ha.	89	139	189*	39*	105	249	463	366	NA	194
3-5 ha.	46	-16	78*	152*	171	212	185	185	158	140
5-10 ha.	41	55	58*	171*	146	300	165	165	150	101

NA - Not available

* - Unreliable due to small sample size

Source: Guatemalan Farm Policy Analysis, Table 38, p. 47

(7) In examining the data for selected farm sizes and regions for corn, beans, and wheat, there also appears to be no consistent pattern with respect to yields, gross income, total costs and net farm income although it appears that BANDESA farmers do better more often than their non-BANDESA counterparts in corn and beans, while the reverse is true in wheat production. (See Tables 2A, 2B, and 2E on pages 16, 17 and 18).

(8) It appears that an important problem with the analysis of impact to date is the inability to definitively determine differences between the credit and non-credit farmers and whether any such differences can be attributed to any particular factor such as the absence or presence of credit and

TABLE 2 ,A: SELECTED YIELD, COSTS AND RETURNS DATA FOR CORN PRODUCTION BY CREDIT TYPE 1/

	All Regions (All sizes)		All Regions (1-3 ha.)		Western Highlands (0-30 ha.)	
	B	NB	B	NB	B	NB
Yield (Kg/ha) (Number of observations)	1840. (534)	1720. (567)	1800. (148)	1650. (173)	1880. (93)	1580. (119)
Gross value of production (Q/ha)	230.00	202.96	228.60	209.55	240.64	189.[illegible]
Fertilizer use (Kg/ha) (Number of observations)	235.77 (394)	245.37 (240)	278.7 (122)	262.32 (76)	320.8 (82)	31[illegible].4 (82)
Fertilizer cost (Q/ha)	29.47	34.35	35.39	41.71	40.42	[illegible]
Pesticide cost (Q/ha) (Number of observations)	6.98 (220)	5.43 (144)	11.00 (49)	8.08 (37)	7.31 (9)	3.47 (21)
Seed cost (Q/ha) (Number of observations)*	[illegible].13 (318)	5.37 (422)	12.77 (96)	5.89 (135)	9.49 (82)	[illegible]
Animal power cost (Q/ha) (Number of observations)	11.16 (169)	[illegible].92 (197)	11.34 (49)	14.80 (65)	22.28 (16)	[illegible] (31)
Machinery cost (Q/ha) (Number of observations)	21.30 (183)	23.10 (149)	23.80 (39)	20.40 (38)	38.70 ([illegible])	[illegible] (8)
Total costs (Q/ha) **	77.04	80.77	94.30	90.88	118.70	92.33
Net return to land & labor **	152.96	122.19	134.30	118.67	121.94	96.27

1/ Source: SA/MR/SA Statistical Working Document # 18 - "A Closer Look at Some Statistics from the 1974 Guatemala Small Farm Survey

* represents the number of farmers using unimproved seed.

** No data in Statistical Working Document #18 did not differentiate between paid and family labor, thus total costs above do not include costs of hired labor. Net returns to land & labor indicate only the relative position of BANDESA farmers and their non-BANDESA counterparts before deducting paid labor costs.

Farmers receiving credit from BANDESA.

Farmers not receiving credit from BANDESA, but selected to match as closely as possible the characteristics of farmers in the B category.

TABLE 2 , B. SELECTED YIELD, COSTS AND RETURNS DATA FOR BEAN PRODUCTION BY CREDIT TYPE 1/

	All Regions (All sizes)		All Regions (1-3 ha.)		Western Highlands (0-10 ha.)	
	B	NB	B	NB	B	NB
Yield (Kg/ha) (Number of observations	963 (134)	846 (165)	1080 (35)	815 (51)	958 (12)	691 (24)
Gross value of production (Q/ha)	257.12	265.34	304.56	259.17	260.58	214.21
Fertilizer use (Kg/ha) (Number of observations)	191.92 (96)	243.74 (54)	185.98 (25)	187.0 (14)	275.00 (11)	371.00 (14)
Fertilizer cost (Q/ha.)	23.99	34.12	23.62	29.73	34.65	53.42
Pesticide Cost (Q/ha) (Number of observations)	9.84 (44)	9.68 (29)	12.30 (12)	5.56 (7)	17.80 (9)	5.11 (6)
Seed Cost (Q/ha) (Number of observations) *	28.18 (96)	20.27 (130)	56.39 (22)	16.61 (44)	13.17 (9)	15.43 (22)
Animal Power Cost (Q/ha) (Number of Observations)	14.74 (58)	14.65 (55)	24.17 (14)	23.87 (18)	14.88 (5)	28.16 (9)
Machinery Cost (Q/ha.) (Number of Observations)	10.00 (8)	15.50 (18)	8.57 (1)	16.00 (6)	- -	- -
Total Costs (Q/ha.) **	86.75	94.22	124.79	91.77	80.50	102.12
Net return to land & labor **	170.37	162.12	179.77	167.40	180.08	112.09

1/ Source: LA/DR/SA Statistical Working Document #18 - "A Closer Look at some Statistics" from the 1974 Guatemala Small Farm Survey

* Represents the number of farmers using unimproved seed.

** The data in Statistical Working Document #18 did not differentiate between paid and family labor, thus total costs above do not include costs of hired labor. Net returns to land & labor indicates only the relative position of BANDESA farmers and their non-BANDESA counterparts before deducting paid labor costs.

B = Farmers receiving credit from BANDESA.

NB = Farmers not receiving credit from BANDESA, but selected to match as closely as possible the characteristics of farmers in the B category.

TABLE 2 , C. SELECTED YIELD, COSTS AND RETURNS DATA FOR WHEAT PRODUCTION BY CREDIT TYPE 1/

	All Regions (All Sizes)		All Regions (1-3 ha)		Western Highlands (0-10 ha.)	
	B	NB	B	NB	B	NB
Yield (Kg/ha.) (Number of observations)	1410. (125)	1540. (104)	1520. (50)	1510. (34)	1490. (93)	1553. (90)
Gross Value of production (Q/ha)	249.57	269.50	267.52	246.13	268.20	273.3[illegible]
Fertilizer use (Kg/ha.) (Number of observations)	424.91 (125)	374.02 (100)	421.0 (49)	338.02 (36)	427.51 (93)	368.[illegible] (87)
Fertilizer cost (Q/ha))	53.11	52.36	53.47	53.75	53.86	52.99
Pesticide Cost (Q/ha) (Number of observations)	4.32 (74)	4.48 (63)	4.28 (26)	5.67 (17)	4.19 (58)	4.3[illegible] (54)
Seed Cost (Q/ha.) (Number of observations)*	28.88 (118)	24.63 (87)	29.95 (46)	25.06 (26)	29.oo (88)	24.18 (74)
Animal Power Cost (Q/ha.) (Number of Observations)	17.81 (35)	20.20 (34)	19.23 (1)	19.43 (13)	15.37 (22)	16.oo (32)
Machinery cost (Q/ha.) (Number of Observations)	15.40 (50)	28.70 (31)	16.oo (23)	35.30 (6)	14.40 (39)	28.50 (27)
Total Costs (Q/ha.) **	119.42	130.37	122.93	139.21	116.82	126.04
Net return to land & labor **	130.15	139.13	144.59	106.92	151.38	147.30

1/ Source: LA/DR/SA Statistical Working Document #18 - "A Closer Look at some Statistics" from the 1974 Guatemala Small Farm Survey

* Represents the number of farmers using improved seed.

** The data in Statistical Working Document #18 did not differentiate between paid and family labor, thus total costs above do not include costs of hired labor. Net returns to land & labor indicate only the relative position of BANDESA farmers and their non-BANDESA counterparts before deducting paid labor costs.

B = Farmers receiving credit from BANDESA.

NB = Farmers not receiving credit from BANDESA, but selected to match as closely as possible the characteristics of farmers in the B category.

technical assistance. Time series data is essential in order to draw valid conclusions on benefits accruing to individual farmers from these factors. The design of the sample survey did not allow collection of such data. Until such time series data are collected in a reliable manner, confusion and controversy will continue to exist with regard to the impact of programs on small farmer incomes and output. Reliability of data and analysis would be enhanced greatly if the time series data were collected through a system of continued farm records on a sample basis rather than through survey procedures.

Even though definitive conclusions cannot be drawn from sample survey data on the impact of credit and technical assistance, survey results do provide some useful policy insights for structuring future credit programs, such as the clear benefits derived from production of diversified crops. There are strong indications that even if benefits from credit can be assured, the small Guatemalan farmer cannot earn a respectable livelihood by continuing to produce corn and wheat on small holdings. A shift must be made to higher value crops on at least a portion of his land if his income is to be increased sufficiently to remove him from his extreme poverty situation.

c. Impact of Technical Assistance on Farmer Borrowers

Available evidence indicates that there is no consistent pattern of increased yields as a result of the technology being applied by the farmer borrowers in the BANDESA/DIGESA program. It is unclear as to whether this is due to the lack of appropriate yield-increasing technologies for small farmers, or whether the system of technology transfer to the small farmer is inadequate. There is some evidence from the Small Farmer Survey data to indicate that the problem may be profitability. The small farmer may be finding that the cost-increasing, yield-increasing technology being recommended cannot be relied upon to increase his income sufficiently

to cover the added costs of adopting the technology. 1/ ICTA is developing an improved research, testing and demonstration program that should considerably improve the availability of profitable, appropriate and reliable small farmer technologies in the medium term.

With regard to the DIGESA technical assistance delivery system, a continuing program of human resources develpment, with adjustments on emphasis to allow establishment of a strong internal in-service training program, combined with improved salary levels to adequately reward ability and training, should achieve a continuing process of technical assistance delivery system improvement. Nevertheless, it must be noted that the technical assistance program of DIGESA is expensive. The 1973 Inter-Country Sector Evaluation Team estimated the direct cost per farmer receiving technical assistance with credit to exceed $200. No attempt was made to estimate GOG overhead costs above this direct cost. At such high costs, it is impossible to replicate such assistance for the entire small farmer population or a major portion of them.

DIGESA recognizes this high cost element of the program and is planning to test a system of farmer "Guías" (guides) that has been used successfully by some of the more dynamic highland cooperatives. These guías would be selected from among progressive small farmers and serve as assistants to field extension agents.

The guía would do much of the one-to-one contact with participating farmers on their farms. The DIGESA field agents then can concentrate on backstopping the guías and on working with farmers in groups at meetings, demonstration plot visits, field days, etc.

5. Cooperative Agricultural Credit Program

Although the Cooperative Federations and their

1/ Preliminary results of a Linear Programming Analysis of the survey data indicate that for the 1-3 hectare and 3-5 hectare size groups, non-credit farmers had higher net incomes per farm than did BANDESA credit farmers.

affiliates have made commendable progress in organizational development and expansion and in providing credit and fertilizer to their members, these limited services cannot be expected to continue to be adequate to satisfy membership or to sustain organizational viability. Cooperatives organizations need to face the challenge of delivery of adequate technical assistance (both in production and permanent resource improvement) and marketing services to their members. GOG public agricultural sector inputs will be a critical component of any such undertaking.

D. Other Critical Constraints to Success in the Guatemalan Small Farmer Development Program

1. Land Quality and Water Use Constraint

Although no statistically reliable evidence has been assembled and analyzed on the matter, it appears that the lack of land and water use improvement and management structures and practices which conserve soil quality and enhance water retention capability (as well as supplemental water supply availability), exercise considerable constraint on small farmers in terms of diversified crop production, as well as in terms of increased yields in basic grains. To be able to produce a high quality and reliable supply of most diversified crops (and a higher level output of basic grains), erosion and leaching control, water retention, biological capital investments, etc., are critical to achieving responses to improved technology requiring cash inputs and improved production management. Most small farmers farm lands on slopes where water run-off rates are high and soil erosion serious. DIGESA programs do not appear to respond to the need to alleviate these critical constraints related to quality improvement and management of the permanent productive resource base of the small farmer, before promoting the use of annual production technology packages. ICTA needs to review its research programs in terms of this type of constraint, as well.

Approximately 90% of land in the hands of small farmers below 5 manzanas in size is of sufficient gradient that soil erosion and high water run-off are serious problems. There are indications that perhaps not more than 10% of this land has the benefit of physical and cultural practices and improvements to significantly reduce these constraints on output and net income.

It would appear that small farmers themselves are aware of the problem. In a recent DIGEPA report that recorded petitions to the President of Guatemala by municipality, more requests were for assistance related to soil conservation than for any other single matter.

2. Market Access Constraints

There is a wide range of diversified crops which appear to have considerable market potential in Guatemala, in the CACM and elsewhere, in both fresh and processed form. However, the lack of an organized market and transportation system which links the small farmer to the appropriate market seems to be the immediate constraint limiting production of these crops. Linkages to available markets implies quality standards and reliable supplies, which, in turn, requires production organization as well as market organization and processing infrastructure.

FM/II/75

FRAMEWORK FOR ANALYSIS AND PLANNING OF NEW LANDS SETTLEMENT FOR THE FRANJA TRANSVERSAL

I. Motivation and Prospects for Developing New Regions in Guatemala.

II. Identification of Potential New Lands Settlement in Guatemala.

- A. Criteria for new lands area selection
- B. Selection of the Ixcán Sector
  1. Availability of government lands
  2. Access by target group highlanders
  3. Road access

III. Proposed Form of Area Settlement

- A. Community and regional organization
- B. A general spatial form
  1. Approximate size of urban center
  2. Public infrastructure
     - a. Roads and access parths
     - b. Urban centers
     - c. Agricultural production assistance
- C. Spatial form of the Ixcán settlement area

IV. Profitability Analysis of Farm Enterprises

- A. The farm production unit

B. Employment

C. Income

1. Farm family cash flow
2. Returns to resources
3. Credit and debt service

D. Conclusions from farm profitability analysis

V. Social Profitability of Ixcán Sector Development

A. Public Costs

1. Road construction
2. Settlement costs
3. Community infrastructure

B. Rate of colonization and flow of infrastructure fund

C. Social benefits

1. Discounted benefits of producers' residuals
2. Increased personal income in the highlands

VI. Organizations and Institutional Aspects

A. Recoupment of Costs

B. Cooperative Activities

C. Community Infrastructure Activities

D. Regional Studies

VII. Conclusion

Annex

Livestock Enterprise Data

FRAMEWORK FOR ANALYSIS AND PLANNING OF NEW LANDS SETTLEMENT FOR THE FRANJA TRANSVERSAL

I. MOTIVATION AND PROSPECTS FOR DEVELOPMENT OF NEW REGIONS IN GUATEMALA

National development objectives are guides to program activities. They also serve as a bench mark against which the effects of alternative programs are evaluated. The specific objectives of the GOG for the years 1975-79 are the following:

(1) Increase agricultural production.

(2) Reduce the concentration of "traditional" agriculture.

(3) Increase the income levels of the rural poor and landless.

(4) Utilize more efficiently the nation's human and natural resources.

(5) Stimulate the development of voluntary associations in productive and social activities.

(6) Increase the capabilities of the public agricultural sector.

The principal objectives of the plan revolve around increased production and a more equitable income distribution. Increased employment of human resources may be instrumental in achieving these objectives. The conservation objective may conflict with them however. Encouragement

and utilization of voluntary associations is viewed as instrumental in attaining production and income distribution objectives.

Stimulating production and increasing rural incomes involves three elements: increased ownership of capital; increased use of capital; more efficient use of capital. Capital is defined in a braod sense to include knowledge, land, and equipment. There are a number of alternative strategies to provide the rural population with increased access to the different forms of capital. Among these alternatives are:

(1) Redistribution of land currently in the private domain. Capital in the form of land is transferred to the rural population. Often some capitalization has taken place on the land and the value of the transfer thereby increased.

(2) Development of new lands. Here little capitalization has taken place, its development rests on the labor resources of the colonizing family. As the capital value of the transfer is low, it is often relatively costly to bring out its productive potential.

(3) More efficient utilization of the small farmer's present capital (land and knowledge) through technical assistance, credit, purchased inputs, and improved seed. There is evidence, however, that the small producer is efficiently using his resources, given his attitudes towards risk and change. This strategy does not involve an increase in capital available.

(4) Capital expansion has been encouraged by overvalued foreign exchange and subsidized credit. The result is that when evaluated at social opportunity cost capital is over-utilized and labor under-utilized on most commercial farms. A policy directed towards equalizing factor prices with their opportunity cost would result in labor being

utilized more intensively relative to the costly capital (land and equipment) often held in large private and government lands.

(5) Increasing the permanent productive capabilities of the farmer's capital. This is done through irrigation, contouring, terracing, intermediate credit, and technical assistance. It is a strategy which can increase the producer's capital.

(6) Increasing the rural dwellers use of other forms of capital, largely through providing employment in labor intensive industries located systematically within development regions. Few countries have experience with this strategy.

These six alternatives are not mutually exclusive, and the efficacy of one may be enhanced when pursued in conjunction with another. Yet they each emphasize different directions of development strategy, utilize different policy variables, and will affect the various target and elite groups in a different manner.

Pragmatically we may reject the first alternative simply because it is unlikely to take place. As to the last alternative, while it is quite promising, very little is known concerning its implications and requirements at the project level.

The development of new regions in the form of creating access to more land and mineral resources must be evaluated against the alternative programs in light of the overall GOG objectives. The present paper provides estimates of contribution to gross domestic product, expressed as B/C ratio; income, and employment estimates for a planned colonization project in the Ixcan Region of the Faja Transversal. It is felt that on this basis alone the proposed project merits consideration.

Nelson's recent study of colonization projects in Latin America presents a grim panorama. In light of his comments, two questions must be addressed:

(1) are there particular socio-economic conditions in Guatemala which make colonization a reasonable policy alternative?

(2) given that colonization represents a reasonable alternative, why should we not expect the project to succumb to the maladies that typically beset such projects: poor planning, poor administration, bad analysis?

Colonization is not the sole answer to agrarian problems. However, in a country that has potentially productive land in relative proximity to areas characterized by high man/land ratios and a concentration of small farms, then expanding the land base available for productive agriculture can contribute to production and income objectives.

A recent paper indicates that this is, in fact, the situation in Guatemala.[1] Table 1 below (from Robertson) indicates the regional concentration of small farms in the North and West. These two regions border the Franja Transversal on the West and south. (see Figure 1).

While the average number of persons per farm does not vary significantly for the two small farm categories, there is a significant difference in the number of persons per hectare. The average number of persons per hectare by region and farm size are given in TABLE 2.

1: Tyrele Robertson, "Minifundia Problem and Man/Land Ratios for Small Farms in Guatemala", 1975.

TABLE 1: REGIONAL CONCENTRATION OF SMALL FARMS

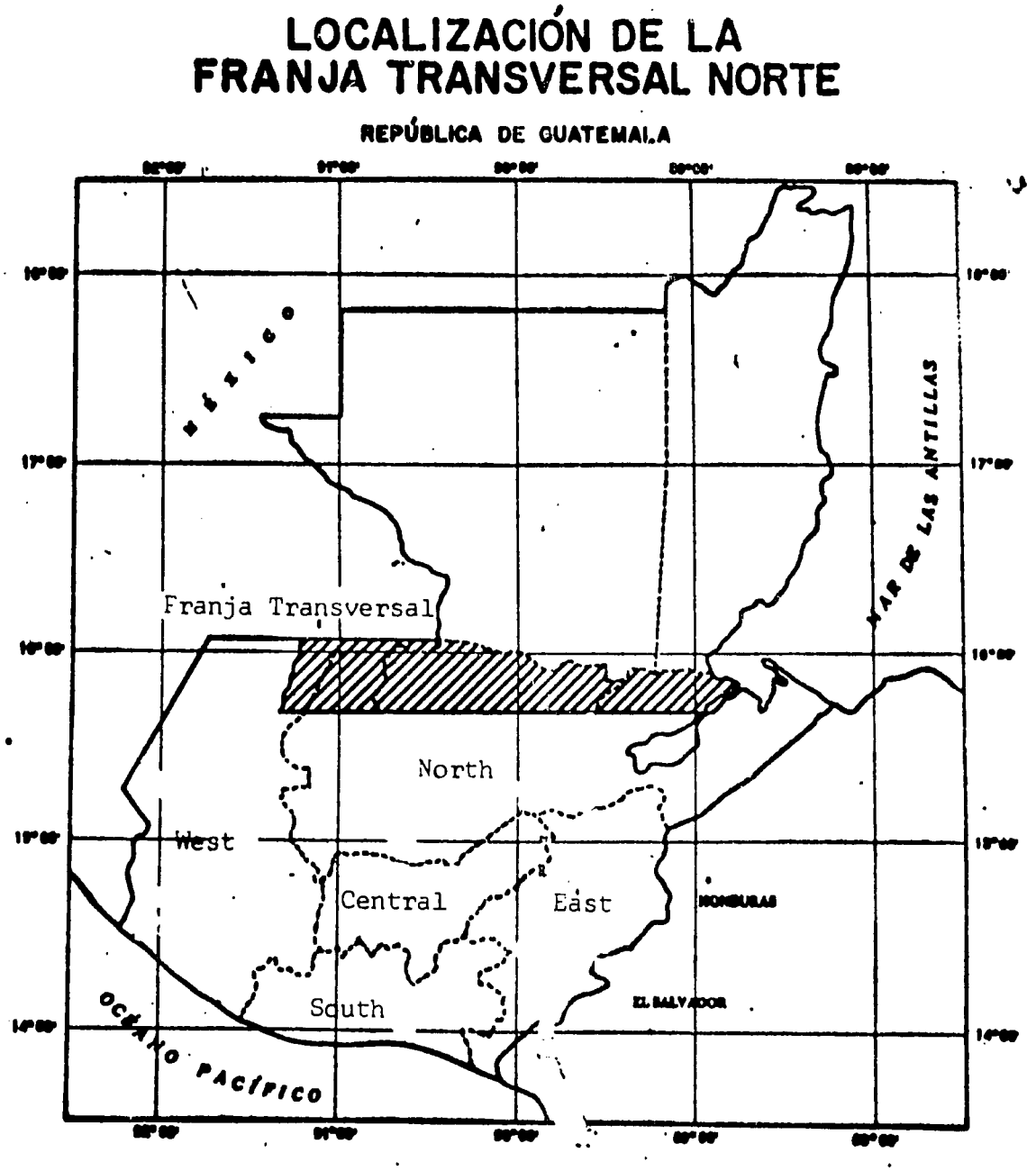
ZONE	% farms less than 5 mzs.	Average Size (Ha.)	% farms less than 2 mzs.	Average Size (Ha.)
North	21.1	1.52	11.4	.42
West	44.1	1.12	65.6	.37
Central	13.3	1.29	9.9	.37
South	8.2	1.17	7.6	.39
East	13.2	1.44	5.4	.43
National	100	1.27	99.9	.38

TABLE 2: AVERAGE NUMBER OF PERSONS PER HECTARE BY REGION AND FARM SIZE

ZONE	Farms less than 5 mzs.	Farms less than 1 mz.
North	3.64 pers/ha.	15.32 pers/ha.
West	5.89 "	16.97 "
Central	4.23 "	16.97 "
South	5.88 "	16.10 "
East	4.27 "	14.60 "

Source for Tables 1 and 2: Thyrele Robertson, "Minifundia Problem and Man/Land Ratios for Small Farms in Guatemala", 1975.

FIGURE 1. REGIONS OF GUATEMALA



Source: Robertson, "Minifundia Problem and Man/Land Ratios for Small Farms in Guatemala", 1975.

Approximately 77% of the farms of less than 1 manzana are located in the regions adjacent to the Franja Transversal. The average number of persons per hectare on farms of this size varies from 15 to 17 persons per hectare. Given the relative proximity of potentially productive land to these areas, the opening of new lands presents itself as a reasonable alternative.

The total land area and tenancy conditions in the Transversal strip are indicated in TABLE 3. More detailed studies indicate the land base available for settlement.

Then the question becomes--how and at what cost can the new lands be opened? These are important features which distinguish the Transversal colonization program from previous Latin American colonization projects. These distinctions involve: (1) the role of the implementing agency, (2) the nature of the implementing agency, and (3) the history of the settlement region.

The role of the implementing agency is that of facilitating the more or less spontaneous movement of small land holders and landless to the region. Within the colonization region, its tasks are, initially, largely organizational: providing a framework for the spatial distribution of activities, titling, and provision of minimum essential services for health and education. (The role of the implementing agency is discussed more fully in a later section).

A persistent problem in colonization projects is that the implementing agency is often an imposed, newly formed structure with little experience in working with the rural population. Also, the settlers arrive unorganized and lack the institutions necessary to communicate their problems to the implementing agency. These difficulties are likely to be mitigated by the use of established regional cooperative federations as the implementing agencies. Guatemala has at least two viable, well administered cooperative organizations. Using the federations and

their affiliated cooperatives as the organizational structure through which settlement occurs has a number of benefits:

(1) the settlement builds on and expands a pre-existing well functioning organization;

(2) the settler begins his adaptation process in the new region within an institutional framework that he has chosen and of which he has some knowledge and confidence.

(3) the federation, as implementing agency, has already established working relations with the cooperatives at the community level.

Finally, the region itself presents a unique historical experience which supports the feasibility of a quasi-directed, minimum infrastructure colonization project. The Ixcán region is not an unknown, entirely uninhabited region. It is the site of a number of more or less spontaneous colonization efforts made possible by religious groups (Maryknoll Fathers) and the Agrarian Reform Institute (INTA). The insights and experience of these settlements have been utilized to obtain estimates on yields, land clearing rates, and labor utilization. INTA has also prepared a large study (OAS/INTA, 72) for a colonization project in the Sebol region of the Transversal. An extensive natural resource survey 1/ has been recently prepared which provides the basic information on land use, climate, and soil characteristics for planning purposes. The project, then, works in an area where a small internal market exists and about which important technical information has been obtained.

In summary then, the project responds to a settlement process already underway; it builds on and extends a demonstrated administrative capacity within the cooperative movement; and it is organized around the principle of facilitating a spontaneous movement within an established institutional framework.

II. IDENTIFICATION OF POTENTIAL NEW LANDS SETTLEMENT IN GUATEMALA

A. Criteria for new lands area selection

From the previous description of the land situation in the Northern Transversal Strip, it was noted that a vast amount of land is potentially available for settlement. In addition, to the Transversal, the Petén region also offers a yet greater land area for potential settlement purposes. A criteria for selecting subportions of the total potential settlement area is needed because of limited development resources (capital, management, technical assistance) for the country as a whole. The choice then involves which of the periphery roads, among several alternatives, should be extended as penetration roads and in what time sequence? This choice should be made on the basis of effectiveness in attaining development objectives as stated earlier. Basically, these objectives can be summed up in terms of contributing to (1) national income and (2) relieving land pressure and increasing incomes of low income groups in the highlands of Guatemala.

Initial criteria for new lands area selection is further simplified as the following:

(a) Availability of Government lands.

Significant portions of the Transversal (and the Petén) have already been settled by INTA, Maryknolls and other private groups and individuals. Other portions are settled by indigenous groups. Land tenancy of other large portions are unknown. Hence, for the immediate future, availability of significant tracts of Government land ready for area settlement is an initial selection criteria. The Perdomo report (March, 1975), describes and locates Government tracts with summary data given in other reports on the land situation in the Northern Transversal Strip.

TABLE 3

GUATEMALA. FAJA TRANSVERSAL ZONA NORTE

Land Area and Tenancy, July 1975

SECTOR	Ixcan		Lachua		Sebol		Modesto Méndez		Livingston		TOTAL	
	Has	%	Has	%	Has	%	Has	%	Has	%	Has	%
A Parcelamientos Agrarios	52 206	5.7	21 946	2.4	27 597	3.0	1 125	0.1	1 828	0.2	104 702	11.4
B Fincas Cooperativas	-.-	-.-	-.-	-.-	13 710	1.5	-.-	-.-	-.-	-.-	13 710	1.5
C Fincas Nacionales	9 025	1.0	11 280	1.2	13 000	1.4	67 689	7.5	11 281	1.2	112 273	12.3
D Baldios	79 682	8.7	197 224	21.6	134 135	14.7	22 331	2.4	39 735	4.4	413 107	51.8
E Fincas Particulares	38 675	4.2	35 800	3.9	33 750	3.7	8 100	0.9	43 266	4.7	159 591	17.5
F Fincas Municipales	22 562	2.5	-.-	-.-	3 228	0.4	-.-	-.-	-.-	-.-	25 790	2.8
G Areas en Litigio	-.-	-.-	-.-	-.-	12 825	1.4	-.-	-.-	-.-	-.-	12 825	1.4
H Parques Nacionales	-.-	-.-	10 000	1.1	-.-	-.-	-.-	-.-	2 000	0.2	12 000	1.3
	202 150	22.1	276 250	30.2	238 245	26.1	99 245	10.9	98 110	10.7	914 000	100.0

(b) Access by target group highlanders

Settlement areas should be easily accessible by the low-income target groups of the highlands. The reasons for this include: (1) it insures a large supply of potential migrants both agricultural and service workers, and ultimate success of the project, (2) it reduces the cost of migration in terms of both economic and social costs, (3) it enhances the likelihood of a more spontaneous migration and settlement process, and (4) it will tend to relieve the land pressure in the most critical regions of the country.

(c) Primary road access

New settlement areas by definition generally do not have road access. This, then, becomes the primary cost element of the settlement project and hence a preliminary factor determining which settlement area commences first.

B. Selection of the Ixcán Sector

Preliminary discussions and observations would suggest the Ixcán Sector of the Transversal as an important alternative in new lands access development. This opinion is based on results of criteria established in the previous section.

1. Availability of Government Lands

A map currently being prepared by the Planning Council shows land tenancy of the Ixcán Sector with total available Government lands identified. TABLE 4 contains data from this map on Government lands by land class. A total of 76,554 hectares of Government land is available for settlement. Of this total, 40,976 hectares is land of Class III or better.

TABLE 4: AVAILABLE GOVERNMENT LANDS FOR SETTLEMENT PURPOSES IN THE IXCAN SECTOR (Hectares)

Land Class	INTA Under-developed Lands a)	National Farms	Untitled Land (Baldíos)	TOTAL
I			429	429
III	12,524	2,000	26,023	40,547
V			2,533	2,533
VII	6,253	350	26,442	33,045
Total	18,777	2,350	55,427	76,554

The specific tracts of Government land immediately available for settlement are identified in Figure 2. Size of individual land tracts are given in TABLE 5. About 38,000 hectares of agricultural land (Class I and III) is immediately available for settlement purposes. Preliminary indications are that this will settle about 5,000 families in agricultural activities.

a) INTA lands have been surveyed and titles issued by the Government

TABLE 5: SIZE & LAND CLASS OF GOVERNMENT TRACTS AVAILABLE FOR SETTLEMENT, IXCAN SECTOR (Hectares)

Land Tract b)	Land Class I and III	Land Class V and VII	TOTAL
INTA lands a)			
Lot #12	4,298	867	5,165
Lot #13	5,025	3,377	8,402
Lot #20	2,367	2,893	5,269
Untitled	26,452	28,975	55,427
TOTAL	38,142	36,112	74,254

2. Access by target group highlanders

Robertson ("Minifundia Problem and Man/Land Ratios for Small Farms in Guatemala") shows a total of 84,102 farms of less than five manzanas (1964 Ag. Census) in the four departments bordering the Transversal. This is approximately 27 percent of all farms less than five manzanas for the country of Guatemala. Furthermore, the two most western departments have 10,978 farms of less than one manzana or about

a) INTA lands have been surveyed and titles issued by the Government

b) See Figure 2 for Geographic location of the specific tracts.

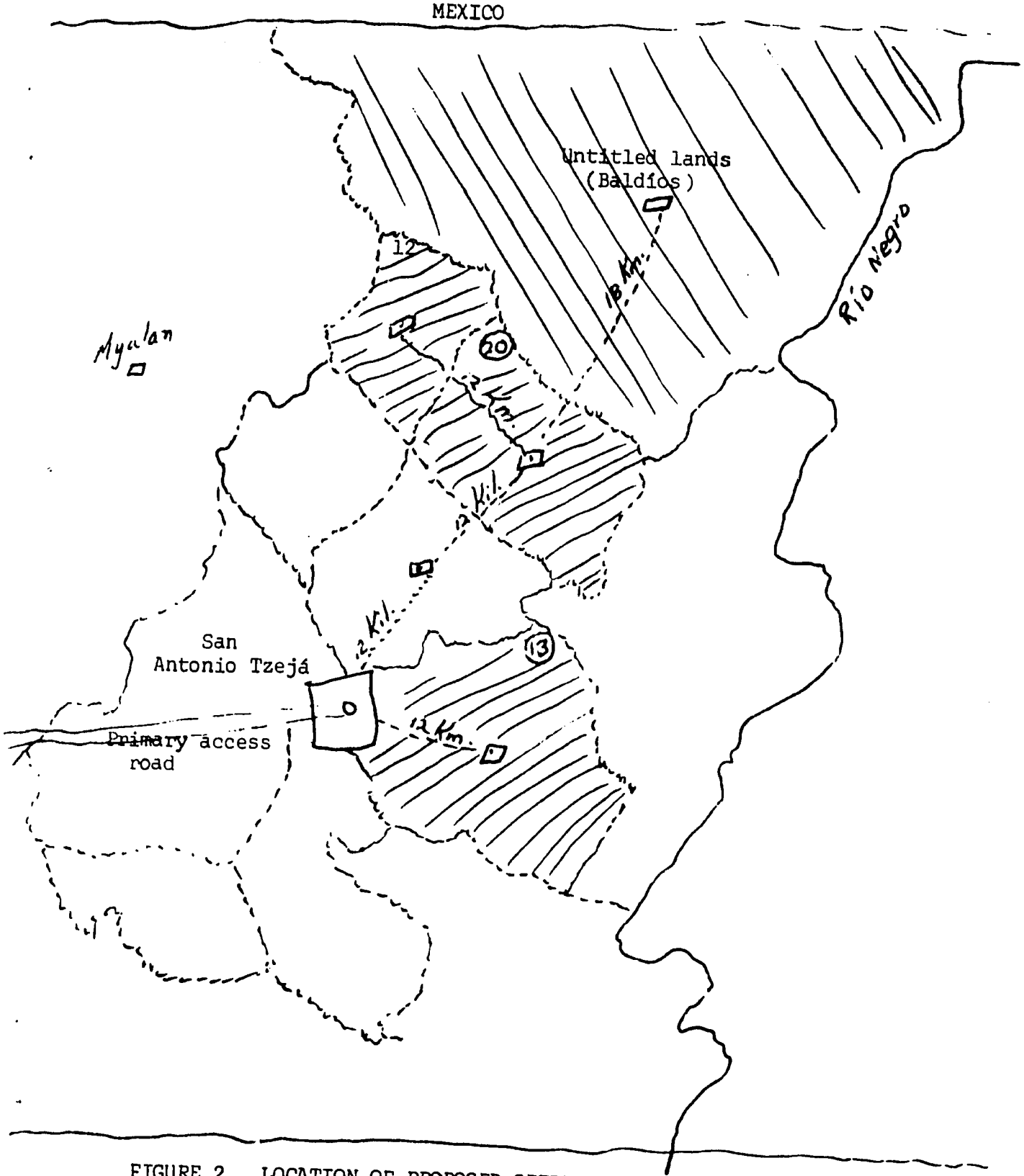


FIGURE 2. LOCATION OF PROPOSED SETTLEMENT AREAS IN THE IXCAN SECTOR

75 percent of all farms less than one manzana in the four departments. These data by departments going from west to east are given in Table 6.

TABLE 6: NUMBER OF SMALL FARMS IN DEPARTMENTS BORDERING THE TRANSVERSAL

Department	No. of farms less than five manzanas	No. of farms less than one manzana
Huehuetenango	29,285	6,169
Quiché	23,293	4,809
Alta Verapaz	65,904	3,332
Izabal	4,960	332
TOTAL	84,102	14,642

The western two departments(Huehuetenango and Quiché) also border on departments with extreme land pressure problems.

These data would suggest that the Ixcán Sector settlement areqs would give access to the extremely densely populated western highland regions.

3. Road Access

The Ixcán Sector identified for settlement purposes is presently without road access. The critical access road from Nueva Concepción to San Antonio Tzejá is about 61.5 kilometers. At a cost of $25,000 per kilometer (not as yet iden-

tified nor verified), this is a total primary road access cost of about $1.5 million.

III. PROPOSED FORM OF AREA SETTLEMENT

A. Community and Regional Organization

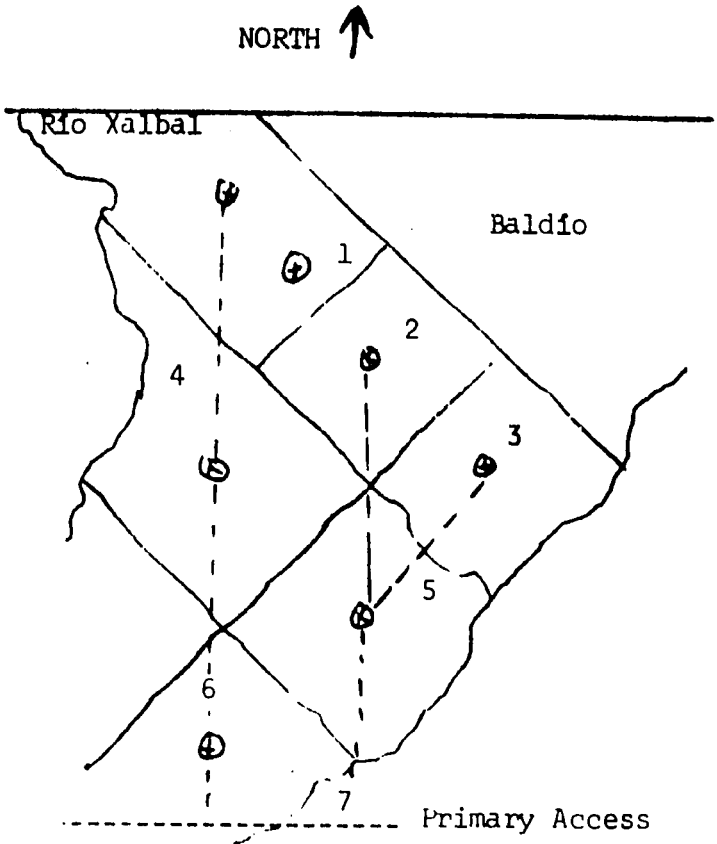
Investment decisions are location decisions. The location of services and infrastructure is a variable to be used to reduce infrastructure costs, facilitate the development of an internal market, increase the reach of services, and reduce transport costs. The development of a market center is increasingly recognized as a necessary condition for modernizing agricultural patterns. Nelson (p. 218) places emphasis on this point, stating that there is little doubt that "the role of a government in accelerating new land development should be oriented towards the promotion of urban centers..." This, he continues, includes the physical planning of the center; locating essential services in the center (health, education, titling, forestry); offering credit and subsidized utilities to encourage concentration of housing, industry, commerce; and making provision for the future establishment of more complex services. Disregarding topographical and soil conditions, the selection of a central place is determined on the one hand by the desire to reach the greatest number of farm families with services and, on the other, by the desire to minimize the cost of transportation to the penetration road. The logical framework for analyzing these relationships is central-place theory.

To see the utility of such a framework consider the pattern of settlement suggested by the INTA survey of the region under consideration.

The following is a rough sketch of their layout:

In their plan, each of the blocks is between 5-8 thousand hectares divided into square parcelas

continued ....



approximately 30 hectares in size. Small centers are indicated in, more or less, the center of each block. Now a location strategy that proposes to settle each block at a time with a small center in each block will have some predictable results. Each center will seek the shortest route to the penetration road--there will be at least two rough paths down to the road, one each from blocks 6 and 7. The more [illegible]ers will connect [illegible]s 6 or 7 as top[illegible]me dictate.

There will be no links between centers: 3 and 5 will not relate to 6; 1 and 2 may have no market link, etc. Opportunities for realizing economies of scale in transportation and marketing are lost. Transport is inefficiently organized. No internal market is facilitated. Diffusion of information is made difficult, as each small center is attempting to provide the same limited services to its community. (Dotted lines indicate possible transport links).

The theory of central places would indicate a different configuration, allowing for the development of an internal market and facilitating the realization of more efficient transportation and provision of services.

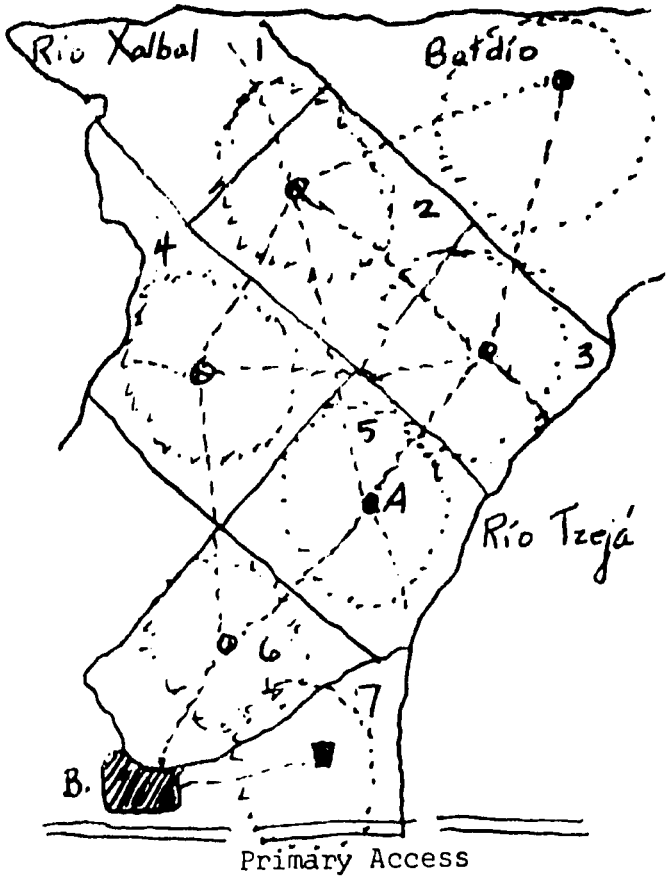


FIG. 4. Settlement Plan B

Planning for a complete distribution of the land area, a point such as A may be selected as the principal central place. Initial development centers basic services at this point as indicated above. Then the initial settlement occurs around this point. An access road connects A to the penetration road. Five more feeder roads provide the dispersed population with access to the central services. Later, colonizations build on these feeder roads in the manner i indicated. It now becomes feasible to make road AB of better than minimal quality--it will handle almost all export commodities. The services provided at A are accessible to a larger population--thus more services can be provided. An internal market is provided at A allowing for crops to be sold, income to be spent on services, and marketing facilities to develop.

B. A General Spatial Form

Villages, communities, and cities tend to form spatial organizations that minimize costs of transportation, urban infrastructure, community services, and private production. This spatial organization can be viewed as a hierarchical ordering of urban places. As applied in a settlement region (Figure 5), the smallest urban order is composed of a village or community of from 100 to 200 families of agricultural producers and local service workers. The next order urban place is called an urban service center of "market town" (although it provides many functions other than marketing such as education, health, etc.). The urban service center provides services and functions not only for local producers but also for the six surrounding communities. Such services are provided because of the larger market served by the urban service center.

A third order urban place is shown in Figure 5 and is called a "regional center." This center serves an even larger market area composed of six urban service centers and a total of 42 communities.

Examples of services provided in a hierarchical manner can be given. Primary schools are located in communities, secondary schools at urban service centers and community colleges or trade schools at the regional center. Health posts are in communities, health clínicas in urban service centers and hospitals at the regional center. Agricultural technical assistance is provided through "promotores" at the community level. "Perito Agrónomos" are located at the urban service centers and provide backstopping services to "promotores" in the six surrounding communities. At the regional center an agricultural experiment station or substation may be located with research results provided to the "perito agrónomos" and finally to the "promotores."

1. Approximate size of urban places

Using general parameters, a rough approximation of size

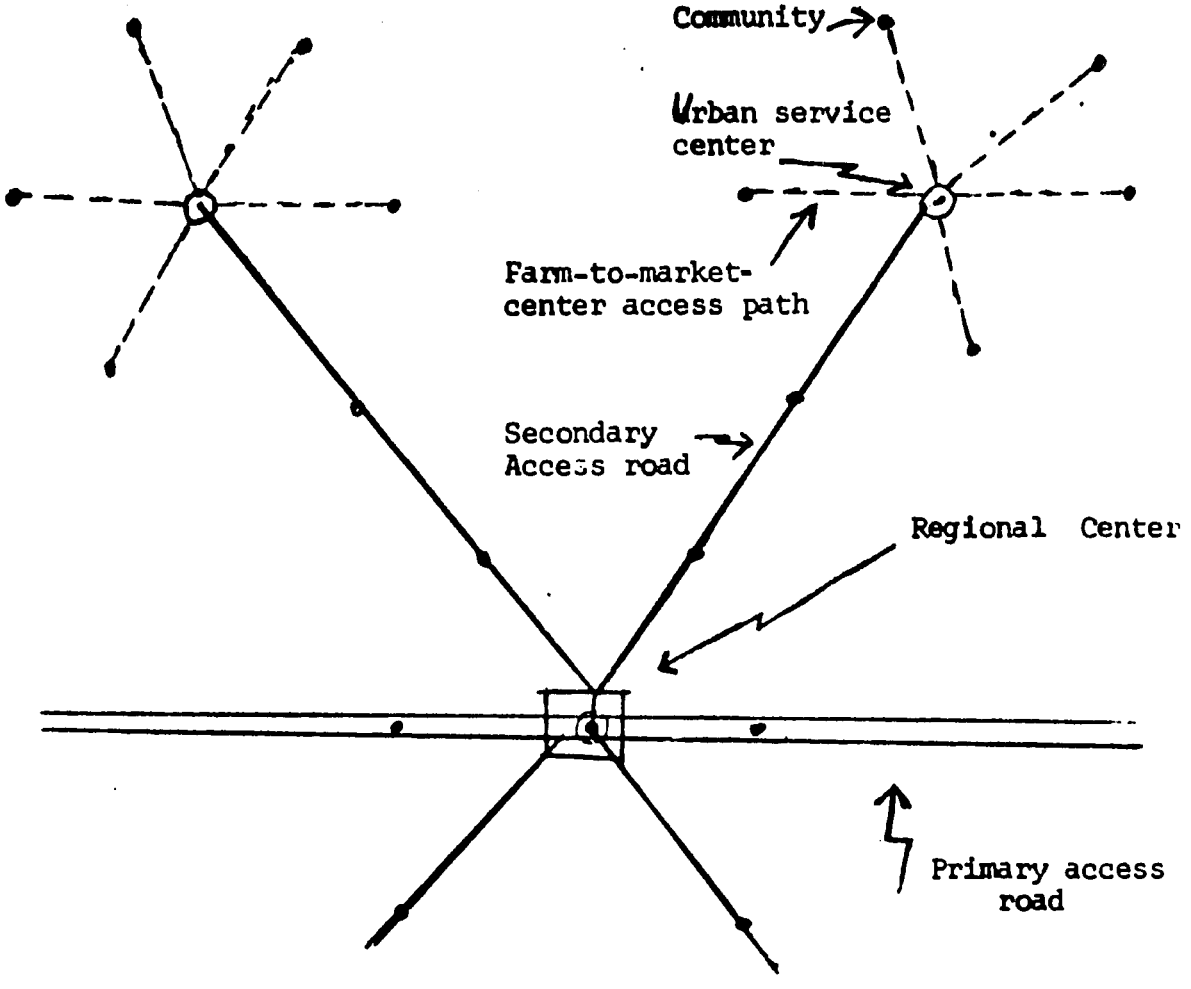


Figure 5 - A General Spatial Form of Settlement

of urban place can be computed. A community with 125 families allocated 12.5 hectares of agricultural land gives a settlement area of 1,562 hectares. With the urban place situated in the center of the settlement the maximum distance any settler would have to walk to his parcel of land, if he lived in the center, would be slightly over two kilometers. Conversely, if the settler most removed from the center were to live on his parcel of land his children would walk about two kilometers to a primary school. Increasing the number of families or the size of parcel of each family would increase the walking distance of that settler most removed from the center.

Assuming the size of parcel is determined on an economic basis and hence is fixed, the variable component becomes the number of families settler per community. Care must be taken so that distances walked to the parcel by farmers or distances walked to school by children do not create disincentives for work or school.

Continuing with the example above, communities are slightly more than four kilometers from the urban service center. Also, the longest distance any community is from the regional center is slightly over 16 kilometers.

The total number of agricultural producers served by the regional center, assuming the structure above, is 6,125. For most regional economies of this size, there is generally one service worker (retailer, banker, teacher, extensionist, etc.) for about every two farmers or other workers in basic employment such as industry and mining. That is, the basic employment multiplier is 1.5. Therefore, in addition to the 6,125 agricultural families in the region there will be an additional 3,062 urban families. The number of urban families will be distributed approximately half in the regional center, 3/8 in the urban service centers and 1/8 in the villages or communities. Table 7 shows the expected population distribution among the various urban places for our hypothetical region.

Table 7 - Population Distribution Among Urban Places for Hypothetical Settlement Region

Urban Place	No.	No. of Farm Families	Rural population	No. of urban families	Urban population	Total Population	Aver. Pop. p/center
Regional Center	1	125	625	1,531	7,655	8,280	8,280
Urban Service Center	6	750	3,750	1,149	5,745	9,495	1,582
Community	42	5,250	26,250	382	1,910	28,160	670
Total	49	6,125	30,625	3,062	15,310	45,935	

2. Public Infrastructure

Major components of public infrastructure for the proposed settlement areas are roads, schools, and health facilities.

a. Roads and access paths

For the general spatial form three classes of transportation and communication access are considered:

(i) primary access road, (ii) secondary access road and (iii) farm-to-market center access path. This transportation network should be considered public access with public domain. Individual parcels so far have not been linked to the farm-to-market center access paths. This can be left to individuals and groups within the community structure. Access to individual parcels or groups of parcels should be planned when the initial surveying

of plots takes place.

The primary access road is a major trunk line of the national road network system with length varying by location of settlement area. A regional center will occur naturally along the primary access road since it serves in a transport cost minimizing function for the surrounding urban service centers and communities. The regional center is the logical location for industrial development to occur which serves to expand the economic base of the regional economy.

Secondary access roads are considered as minimum standard roads for truck transportation. High labor intensive construction methods should be considered for purposes of employing day workers from the settlement area and also workers from the high population density areas of the highlands. In our settlement example above, the urban service centers are approximately 12 kilometers from the regional center. Since two of the urban service centers are on the primary access road, only four urban service centers will be connected by secondary access roads for a total of 48 kilometers.

Actual settlement patterns will differ from the above example with varying lengths of secondary access roads. What is important to recognize is that the eventual settlement form will not and should not vary significantly from the time-tested centrality theory of spatial organization. (It is interesting to note that even though the Maryknoll settlement was not originally established with a centrality concept, it is presently adjusting and moving into this form of spatial organization. Examples of this movement can be observed.)

Farm-to-market-center access paths are the links between a community and the urban service center. These paths are important links between producers and outside markets. Eventually they should evolve into truck transportable roads. In the early stages of settlement, few products will be available for sale since production is for subsistence consumption. Extensive transport systems hence are not required.

It is considered here that paths are to be cleared approximately three meters in width. This allows enough open space for paths to dry after heavy rains. Occasionally small bridges may need to be constructed and perhaps at other places a base of crushed rock or gravel will be required. Sufficient width with public domain should be planned in order that when the future road is constructed the existing farm units will require a minimum of disruption. For this reason, during initial stages of settlement, it may pay to invest in some engineering assistance for laying out locations of farm-to-market-center access paths.

Construction of farm-to-market-center access paths should be considered a public function with costs recouped through the price of the land. Since costs are mainly for labor, the local settlers and others are able to perform this task and receive current compensation. This may be highly desirable in order to eliminate the need for giving settlers essentially a "grubstake" during the initial stage of settlement. Similar labor is also performed on the secondary access road network.

b. Urban centers

A minimum of urban infrastructure is proposed as a project function, both at the community level and the urban service center level. With time and the development process, the needed amounts and types of urban infrastructure will evolve. Consideration, however, should be given to three urban functions.

Urban Land. Plots should be reserved at the land use planning stage in both the community and urban service center for settlers who decide to reside in the community rather than on their parcel; urban service workers; and commercial and public enterprises. In our example above there are 125 agricultural families and 9 urban families for a potential of 134 families living in the community. However, not all of the agricultural families will choose to live in the community.

process. If urban land is available and unused, it should be rented on an annual basis to new settlers who have not yet received their parcel or to other settlers able to use additional land. On the other hand, flexibility should be provided for "buying" out adjacent agricultural parcels if additional urban land is needed.

Health Post. Health posts (Long and Viau, 1974) should be available at the urban service centers. Each urban service center in the example above serves a population base of 1582 which is adequate for a fully staffed health post consisting of a rural health technician and an auxiliary nurse (Long and Viau, 1974, page 3). This team can also provide assistance in the communities to the health committee, health promoter and retrained midwife.

The regional center should be encouraged to build a clinic or small hospital, if none is currently available. This can be done by means of a grant from the settlement project for partial costs of construction and equiping. A further grant should be committed through the Ministry of Health.

3. Agricultural production assistance.

Several alternatives are available for organizing agricultural settlement and production assistance. In our example, each urban service center serves a total of 875 settlers which is of sufficient size to form a cooperative. FECOAR has individual cooperatives ranging in size from 500 members to 2,000. An alternative to the urban service center cooperative is a regional center cooperative that serves two or more urban service centers. Two urban service centers would have a membership of 1,750 and three would have 2,625 members.

Several organizational alternatives are available in terms of using existing highland cooperatives in establishing the settlement area. Individual cooperatives may be used to settle a complete community in the settlement area. Most cooperatives

should be large enough to recruit the 125 families required to settle one community in our hypothetical example. This number is not too large to prevent settling a community in one to two years' time. As other highland cooperatives settle other communities we begin to form the spatial system of an urban service center and its surrounding communities.

The first community settlement should be at the urban service center location as given in Figure 5. There will be a tendency for planners to want surrounding communities laid out in a pie-shape with each community attaching as closely as possible to the urban service center. This should be prohibited. The first community settlement (at the urban service center) should be laid out in as nearly a square (or better yet, a hexagon) shape as possible with the urban service center located in the center. Surrounding communities are established on the perimeter of the original settlement with connecting farm-to-market-center access paths.

Each individual community represents an individual cooperative from the highlands and to a certain extent functions as an auxiliary. However, it is an auxiliary only in the sense of recruiting settlers and assisting in the adjustment process. The highland cooperative is too far removed from the settlement area to provide the needed services of marketing, technical assistance, credit, etc. The settlement community is too small (125 members) to efficiently operate as an individual cooperative. Therefore, several settlement communities (perhaps all those surrounding the urban service center) should band together and form one efficient sized cooperative.

The ability of communities representing auxiliaries of different cooperatives to function together could become a factor in settlement organization. However, because of the limited number of services provided by the cooperative in the early stages of settlement, the need for communities to operate jointly is minimal. To circumvent this potential problem area, it may be advisable to strive for as much homogeneity between communities

of the same urban service center as possible. The same geographic area in the highlands is one homogeneous characteristic in which selection can occur. Assigning settlement communities of the same urban service center to the same federation of cooperatives (FECOAR, FENACOAC, Penny Foundation) is selecting for homogeneity of parent organization. This would be the same as allocating one large tract of land to one federation with individual cooperatives settling individual communities.

C. Spatial form of the Ixcán settlement area

The exact spatial form of the Ixcán settlement area will be determined at a later date when the appropriate maps have been supplied. A general idea is given in Figure 2 on the location of each of the available settlement tracts as described in Table 5. Their location relative to the primary access road is also shown.

The purpose of showing location of available lands is to obtain a preliminary estimate of secondary roads and a preliminary estimate of number of settlement communities. The four settlement tracts can be linked to the proposed regional center at San Antonio Tzejá with approximately 66 kilometers of secondary access roads.

A preliminary estimate of the number of parcels for each of the land tracts is given in Table 8. The average size parcel has seven hectares of Class III or better land following the results of the farm enterprise analysis (see Section IV). A total of 5,549 parcels is estimated for the Ixcán settlement area.

Exact planning of the number, location and size of settlement communities and urban service centers is not possible at this stage. More information is required on location and degree of development of other centers; location of Class III land units; and location of natural barriers such as rivers. However, we can assume there will be at least four urban service centers which must be integrated into the secondary road access network. If we assume communities with about 200 settlers each, then there would be about 24 communities plus the four urban service centers.

Table 8 - Estimated Number of Land Parcels by Settlement Tract, Ixcán Sector

Settlement tract	Total Hectares	Average size parcel (has.)	Total Number of parcels
INTA lands			
Lot # 12	5,115	10.6	482
Lot #13	8,401	10.6	792
Lot #20	5,259	10.6	496
Untitled (baldíos)	55,427	14.7	3,779
Total	74,202	13.4	5,549

Estimated population for the Ixcán settlement area is given in Table 9. An eventual population of 35,875 is expected in the settlement area. The average population per community is 1,073 and per urban service center is 2,532.

Table 9 - Population estimates for the Ixcán settlement area

Urban place	Number	Rural families	Urban families	Total population	Average size of urban place
Urban service center	4	800	1,226	10,130	2,532
Communities	24	4,800	349	25,745	1,073
Total	28	5,600	1,575	35,875	

The average number of hectares for settlement purposes around each community is 2,680 hectares. This means the maximum distance for any settler to his parcel from the center of the community is slightly over 2.5 kilometers. The maximum distance any settler would be from the urban service center would be a little more than 7.5 kilometers. To connect all communities to their urban service center would require construction of about 120 kilometers of farm-to-market-center access paths.

IV. PROFITABILITY ANALYSIS OF FARM ENTERPRISES

A. The Farm Production Unit

This section discusses the characteristics of the farm units expected to develop in the region. The analysis is based on a variety of sources. Principal among them are: conversations with members of the Maryknoll coop in Ixcán Grande; interview with Luis Gurriarán, advisor to the INTA project in Ixcán; and the OAS/INTA (1972) study. The information gathered from these sources on crop possibilities, soils, rates of land clearing, labor requirements, and yields represent reasonable expectations based on observation and experience.

From them we develop a set of crop possibilities and budgets. A crop pattern and sequence of land clearing is then established. This information enables us to generalize a "typical" farm developmentprocess. The typical development process is then used to provide estimates of:

-- potential income levels for a farm family, and returns to resources

-- guidelines for establishing an adequate size farm

-- the credit and extension services required by the settlers

-- the demand for farm labor

-- the principal constraints that will arise as production moves from subsistence to market oriented activity.

Farm units will differ in crop mix depending on the particular soil and topographic conditions, market access, supply of labor, traditions, and sagacity of the entrepreneur. Yet there is substantial uniformity of crop mix for the region as a whole. Corn is the primary crop. Beans, chile, rice, vanilla, sugar cane, cardamom, and citrus are also cultivated. Corn and beans are the traditional staples of the diet. Cardamom has been introduced as a cash crop with some success. Charles Atlee suggests that many spices can do well in the region including allspice, nutmeg, and pepper. Vegetables such as sweet potatoes, squash, and pigeon pea are also likely to do well.

It is assumed that little technical assistance and credit will be provided at the outset. Thus his initial activities will be directed towards corn and beans. Nor is the use of fertilizer and insecticides foreseen in the initial years. With time, cattle, black pepper, cardamom and rice are introduced. Experience indicates that this is a valid sequence to anticipate. The relatively high transport costs argue that crops with a high value to weight ratio (such as cardamom) should be introduced. Also the soil characteristics of the region require that consideration be given to pasture and permanent crop activities. Modern inputs are included in the annual crop budgets in later years, reflecting the possibility that declining yields on annual crops cannot, in the long run, be avoided by continual expansion of the land base. Dual purpose cattle provide milk and meat for the family and utilize land less suitable for crop production.

The actual selection of production activities by the farmer from among the possibilities will depend on a number of factors. The most important will be market access. If relatively low cost market access is not forthcoming, production of corn, beans, and rice will be directed at home consumption only. Other factors influencing the choice of

activities include relative prices, availability and quality of technical assistance, risk factors, and the marketing system available.

The crop budgets are given in Tables 10-14.

The rate at which land can be cleared is a significant constraint in the development of the farm enterprise. The experience of the settlers in the region suggests that a family will clear 1-2 hectares per year. This may be due to physical constraints: the time of year the settler arrives relative to the burning, planting, and crop seasons. It may also be due to limited incentives because of lack of access to markets for crops grown--so that only enough is cleared to meet subsistence requirements. Further, as crops are put into production, more family labor is used for those activities and less is available for land clearing.

In general, it requires 3-6 months before a new settler is ready to begin planting. During this period, initial cutting, drying, burning, clearing, and shelter construction takes place. Employment on other farms is used to provide income to purchase food and materials for work. Topography explains a great deal of the varience in the 3-6 months' estimate. The experience in "La Resurrección" (a year old settlement begins in the Ixcán Grande region), suggests that if settlement begins early in the dry months, say January to March, the first planting of 30-50 cuerdas (1.3-2.2 has.) of corn occurs in June and a seoond planting can be accomplished in October.

The amount of labor required for each activity es presented in Table 15.

We assume that the crop mix will follow the pattern outlined above: from traditional staples to pasture and permanent crops. We assume also that a family of 5 has available approximately 2.0 adult units of labor, with which it can clear 1-2 has. of land per year. Given these assumptions, a land-use flow chart (Table 16) is developed to illustrate the typical case.

TABLE No. 10

CORN
PRODUCTION BUDGETS: COSTS OF PRODUCTION, WORKING CAPITAL, INCOME AND REVENUE PER HECTARE FOR SELECTED CROPS. TRADITIONAL AND INTERMEDIATE TECHNOLOGY LEVELS

	TRADITIONAL						INTERMEDIATE			TRADITIONAL, AFTER 3 YRS.					
	Corn 1 (Jun-Oct)			Corn 2 (Jan-Mar)			Corn 1 & 2			Corn 1			Corn 2		
	Q	P	Value	Q	P	Value	Q	P	Value	Q	P	Value	Q	P	Value
Cash Expenses			7.41			6.50			62.82			7.41			6.50
Seed	35 lbs.	.15	5.25			5.25	35 lbs.	.15	5.25	35 lbs.	.15	5.25			5.25
Other			2.16			1.25			2.16			2.16			1.25
Fertilizer (15-15-15)							4qq.	13.85	55.40						
Value of Product	30qq.	6.80	204.00	25	6.80	170.00	30	6.80	204.00	22.5	6.80	153.00	18.75	6.80	127.50
Net revenue			196.59			163.50			141.18			145.59			121.00
Labor Input			67.00			45.00			85.00			67.00			45.00
(M.D/yr ea. Q1.00/day)															
Net Income			129.59			118.50			56.18			78.59			76.00

TABLE No. 11

BLACK PEPPER

PRODUCTION BUDGETS: COSTS OF PRODUCTION, WORKING CAPITAL, INCOME AND REVENUE PER HECTARE FOR SELECTED CROPS, TRADITIONAL

	YEAR 1			YEAR 2			YEAR 3		
	Q.	P.	Value	Q.	P.	Value	Q.	P.	Value
Cash Expenses			32.20			3.22			3.22
Seed	28 qq	1.0	28.00			2.80			
Other			4.20			0.42			
Value of Product	0		-	-	-	-	16 qq.	85	1,360.00
Net Return			-32.20			-3.22			1,356.78
Labor			165.00			122.00			240.00
NET INCOME			-197.20			-125.22			1,116.78

TABLE No. 12

B E A N S

COST OF PRODUCTION, WORKING CAPITAL, INCOME AND REVENUE PER HECTARE

TRADITIONAL AND INTERMEDIATE TECHNOLOGY LEVELS

	BEANS (Trad.)			BEANS (Int.)		
	Q.	P.	Value	Q.	P.	Value
Cash Expenses			31.72			73.27
Seed	1.5 qq.	19.00	28.50	1.5 qq.	19.00	28.50
Other			3.22			3.22
Fertilizer				3 qq.	13.85	41.55
Value of Product	12 qq.	16.15	193.80	12 qq.	16.15	193.80
Net Revenue			162.08			120.53
Labor			82.08			-4.55

TABLE No. 13

R I C E

COSTS OF PRODUCTION, WORKING CAPITAL, INCOME AND REVENUE PER HECTARE

TRADITIONAL AND INTERMEDIATE TECHNOLOGY LEVELS

	RICE (Trad)			RICE (Int)		
	Q.	P.	Value	Q.	P.	Value
Cash Expenses			43.60			99.00
Seed	2 qq.	20.00	40.00	2 qq.	20.00	40.00
Other			3.60			3.60
Fertilizer				4	13.85	55.40
Value of Produ	20	13.60	272.00	20	13.60	272.00
Net Revenue			228.40			181.40
Labor			80.00			90.00
NET INCOME			148.40			91.40

UNCLASSIFIED

TABLE No. 14

CARDAMOM
COSS OF PRODUCTION, WORKING CAPITAL, INCOME AND REVENUE PER HECTARE
YEARLY BASIS, INTERMEDIATE TECHNOLOGY

YEARS:	1			2			3			4		
	Q.	P.	Value	Q.	P.	Value	Q.	P.	Value	Q.	P.	Value
Cash Expenses			248.17			139.50			138.41			138.41
Seed(bulbs)	1450	.05	72.50			7.25			7.25			7.25
Fertilizer	8qq.	13.85	110.80			110.80			110.80			110.80
Shade(Plants)	650	.05	32.50			3.25			3.25			3.25
Other			32.37			20.93			17.11			17.11
Value of Product	--	--	--	650R.	.2	130.00	650R.	.2	130.00	650R.	.2	130.00
							5qq.	110.	550.00	6qq.	110	660.00
Net Revenue			-248.17			- 9.50			541.59			651.59
Labor			97.00			91.00			157.00			240.00
NET INCOME			-345.17			-100.50			384.59			411.59

TABLE No. 15

LABOR COEFFICIENTS: Man days/yr. by Hectares of Activities (parenthesis indicate coefficient for intermediate technology level)

man/days/yr. Activity(1 ha.)	1	2	3	4	5	6
Land clearing	30	25	25	35	35	
Housing Const.	400	400	400	400	400	
Corn 1	67	67	67	67 (85)	67 (85)	
Beans	80	80	80	80 (83)	80 (83)	
Bl. Pepper		165	122	220	250	
Rice		80	80	80 (90)	80 (90)	
Corn 2	45	45	45	45 (57)	45 (57)	
Cardamom			96	91	157	240
Fencing				1		
Pasture Cover		10				
Pasture Maint.			5	5	5	
Livestock			30	30	30	

Source: Interviews with settlers in colonization areas; OAS/INTA "Proyecto" 1972; GAFICA "Plan Perspectivo para el Desarrollo y la Integración de La Agricultura en Centro América", Vol. II, Part J, 1972; Latinconsult, "Estudio de Factibilidad de un Programa de Desarrollo de la Ganadería Bovina en el Departamento del Petén", 1974.

Note: 1. Land clearing coefficient rises to reflect the observation that the least sloped land is cleared initially and the more difficult land is cleared later.

TABLE 16 - AMOUNT OF LAND CLEARED BY ACTIVITY AND BY YEAR FOR A SETTLEMENT FARM - Has.

Activity	Year 1	2	3	4	5
Corn 1	1.3	1.3	1.9	1.9	1.9
Corn 2		.6			
Beans	(.3)	(.3)	(.3)	(.3)	(.3)
Black Pepper		0.1	0.1	0.1	0.1
Rice			0.7	0.7	0.7
Cardamom			1.0	1.0	1.0
Prepare Pasture		1.2		0.8	2
Pasture&Livestock			1.2	1.2	
Cleared but idle	0.2	0.3	0.3	0.3	1.3
TOTAL	1.5	3.5	5.2	6.0	7.0
INCREASE		2.0	1.7	1.8	1.0

It is estimated that the new settler will be able to prepare 1.5 hectares of land the first year. Of this 1.3 hectares goes into corn production and the remainder is for his housing. This corn crop is followed by .3 hectares of land is opened each year which goes into crops while previously cropped land goes into pasture.

In the second year, 1/10 of a hectare is given to black pepper. Cardamom is introduced on 1 ha. in the third year along with cattle.

At the end of five years, 7 hectares of land have been cleared. The crop pattern has become more diversified as cattle and permanent crops have been introduced. This land clearing process and the associated activity mix is used to provide income and employment estimates, direct credit requirements, and estimate returns to the farmers' resources.

B. Employment

On the basis of the labor coefficients (Table 15) aggregate employment for the projected clearing and crop mix by year is calculated:

TABLE 16a - FARM LABOR REQUIREMENTS AND AVAILABILITY
YEAR

	1	2	3	4	4T	5T	5T
Labor required a)	294.5	325.	486	499	584	566	617
Family Labor b) Available	472	472	472	472	472	472	472
Surplus + Deficit (-)	177.5	+147	-14	-27	-112	-94	-145

a) Sum of labor requirements for all farm productive and land clearing activities. Nothing assumed about labor demand for community and cooperative activities.

b) Assumes 2.0 mandays available per family for 236 working days per year (OAS/INTA, 1972, pp. 44-46).

c) Assumes intermediate technology, utilizing fertilizers is adopted. A demand for hired labor appears by the third year of settlement given the assumptions made. The trade-off between using family labor for land clearing or for producing crops on land already cleared appears quickly. The relatively high magnitude of unemployed mandays in the first two years does not indicate that land can be opened more rapidly than assumed. These estimates are annual aggregates and do not take into account peak seasonal requirements. There may be periods when labor is acutely scarce. The arrival time of the settler and his family, the timing of crop cycle, and the necessity for outside income will all constrain the availability of labor.

C. Income

The crop budgets and the projected pattern of activities are used to estimate (a) farm family cash flow; (b) financial requirements for the farm unit - credit requirements and service of debt; and (c) returns to the farmer's resources - his land, capital, management and labor.

This section provides a basis for answering two principle questions: what return can the farmer expect from colonizing and, secondly, what residual remains for payment for the services provided to him. The income estimates are also useful for estimating the size of farm necessary to adequately support a family. The sensitivity of income to changes in yields is also explored.

1. Farm Family Cash Flow

The gross cash flows associated with the projected farm development are shown in Table 17. The net return indicated is the net return to all the farmer's resources and project services. It is very gross estimate of well-being. The estimates in the cash flow analysis are derived from the crop budgets. Hired labor requirements are from Table 16 with labor valued at $1.00 a day. An initial capital investment of $30.00 is estimated for tools and equipment. It is depreciated at 50% per year. The base estimates are given by non superscripted years. The important assumptions underlying the estimates are:

(1) that a rotation system can be established during the first four years so that substantial declines in yields do not occur.

(2) in the fifth year fertilizers are introduced for the following reasons: the coop will be making fertilizer available; yields are likely to be declining and continually expanding the land base is seen to be a poor strategy as the settler nears the limits of his relatively good land; and, lastly, by the fifth year the cash income required to pay for fertilizer exists.

(3) the net resource returns make sense only if there is a market for the goods produced. There must be access to markets for corn if the projected income levels of the initial years are to be achieved. Lacking access to markets, the net return figures have little meaning most of the corn and rice production will go to increased home consumption. Increased consuption, of course, has value. At the same time however capital accumulation does not take place as it would if markets were accessible.

(4) cardamom is introduced as an example of the effect a high value/weight crop can have on farm income.

CASH FLOW

TABLE No. 17

FARM ENTERPRISE PROFITABILITY ANALYSIS. TYPICAL FARM DEVELOPMENT, CROP YEAR JAN-JAN

YEARS:	1	2	3	3[d]	4	4[f]	4[g]	5[h]	5
Receipts									
Corn 1	265.20	387.60	387.60	290.70	387.60	290.70		218.03	387.60
Corn 2	221.00	323.00	323.00	242.25	323.00	242.25		181.68	323.00
Beans	58.14	58.14	58.14	43.61	58.14	43.61		32.71	58.14
Bl. Pepper					136.00	136.00		136.00	136.00
Rice			190.40	190.40	190.40	142.80		107.10	190.40
Cardamom					130.00	130.00		680.00	680.00
Livestock			102.00	102.00	136.00	136.00		121.00	121.00
Subtotal			1061.14	868.96	1361.14	1121.36		1476.52	1896.14
Gross Income(A)	544.34	768.74	1061.14	868.96	1361.14	1121.36	1361.14	1476.52	1896.14
Outlays									
Operating Expenses									
Corn 1	9.63	14.08	14.08		14.08		119.36	14.08	119.36
Corn 2	8.45	12.35	12.35		12.35		119.36	12.35	119.36
Beans	9.52	9.52	9.52		9.52		21.98	9.52	21.98
Bl. Pepper			30.52		30.52		69.30	30.52	69.30
Rice			30.52		30.52		69.30	30.52	69.30
Cardamom								127.91	127.91
Livestock			29.00		19.00		19.00	10.00	10.00
Subtotal(Opn)	27.60	35.95	95.47	95.47	85.79	85.79	349.32	204.7	468.23
Capital Exp									
Equipment	30.00	15.00	15.00		15.00		15.00	15.00	15.00
Bl. Pepper		3.22	0.32						
Cardamom			248.17		139.50		139.50	10.50	10.50
Livestock			500.00						
Subtotal (cap)	30.00	18.22	763.49	763.49	154.50	154.50	154.50	25.50	25.50
Hired Labor			14.00		27.00	27.00	112.00	94.00	145.00
TOTAL COSTS (B)	57.60	54.17	872.96	872.96	267.29	267.29	615.82	324.20	638.73
NET RETURNS TO ALL RESOURCES (A B)	490.74	714.57	188.18	-4.00	1093.85	854.07	745.32	1152.32	1257.41

The cash income generated by it in the fifth year overshadows that of all other activities. It is introduced with better than traditional technology.

The estimates provided under the super-scripted years show to some extent the sensitivity of the cash flows to changes in yields on some of the crops. The assumptions underlying each are:

(1) 3^d - yields on corn 1, corn 2, and beans are reduced by 25 percent compared to the initial yield estimates. This is an example - in the projected crop pattern we have assumed that land cleared for "pasture" in the second year is used in the third year for corn and bean production and that 1.2 hectares of the land which was in corn and beans in the first two years becomes pasture in the third. Then it is reasoable to expect that yields will not substantially decline. The example does however indicate that net returns are quite sensitive to changes in yields whether they are due to declining fertility, estimation errors, or lack of care on the part of the farmer in the initial years.

(2) 4^f - assumes a 25 percent decline in yields from theinitial estimates for corn 1, corn 2, beans, and rice. Here the declining yields are almost offset by increased income resulting from black pepper, bananas and livestock.

(3) 5^h - yields on corn 1, corn 2, beans, and rice decline another 25 percent from the assumption of 4^f. We note again, that expansion into permanent crops of high value and cattle act as insurance against declining yields on the intensively cultivated traditional staples.

2. Return to Resources

The net returns to all resources is a very gross measure of the financial picture. It fails to consider that some portion of the returns is attributable to the use of resources which have a value in alternative uses. The farm family contributes labor, capital, management skills, and accepts some risk. Settlement services such as recruitment, surveying, titling, and administrative facilities, are supplied by the implementing agency. Community infrastructure - access paths - also increase the value of the land holding.

In table 18 the net returns to all resources are disaggregated to estimate a residual return to land, management, and risk taking. The treatment of the opportunity cost of family labor is never entirely satisfactory. It cannot be valued at the hired labor wage rate because hiring out is not always an alternative and the family members are of varying ages and sex with differing work capacity. Here we estimate the value of family labor as the subsistence level of income that must be earned for the family to maintain itself. Over the long run family labor must at least earn the subsistence income in its best alternative employment. The opportunity cost of owner's capital is taken to be 12 percent. The residual return to land, management, and risk is the best economic statement of enterprise feasibility. It is against this residual that charges associated with cooperative services and community infrastructure can be charged. (See "Social Profitability of Ixcan Sector Development" below for further discussion).

TABLE No.18

RETURNS TO RESOURCES[a)]

YEARS:	1	2	3	3d	4	4f	4g	5h	5
Net Returns to All resources	486.74	714.57	188.18	-4.00	1093.85	854.07	745.32	1152.32	1257.41
- Subsistence [b]	275.00	286.00	333.00	333.00	357.33	357.33	357.33	362.71	362.71
Return Land, Capital, Mngmt.	211.74	428.57	-144.82	-329.00	736.52	496.74	387.99	789.61	894.70
- Opp Cost Equity (12%)	3.60	3.60	91.62	91.62	59.94	59.94	59.94	48.06	48.06
Return to land and Management, Risk	208.14	424.97	-236.44	-420.62	676.58	436.8	328.05	741.55	846.64

b) Value of subsistence consumption based on estimate of consumption of corn and beans required to achieve the level of consumption achieved by the middle 30% of the Guatemalan population. Average family size of 5 persons. The estimate is close to the observed family income level which identifies the lowest 30% of the rural population who, by observations, are living at the subsistence level. It is augmented by 4% annually to account for changes in family size and structure.

a) Returns in succeding years are equal to year 5.
Inv.value of livestock equal to $150. per animal unit. See livestock annex for growth of animal units alternative 1.

3. Credit and Debt Service

The credit and debt service requirements are shown in table 19. The introduction of cattle in the third year causes the residual return to land and management to become negative. The gross return to a livestock activity however is estimated at 25-30 percent (see Annex on Livestock Enterprise data). A twelve year loan with interest paid the first four years and interest with principal the succeeding eight years would fir most cases. The credit and debt service requirements under this arrangement are shown more fully in the livestock annex. A loan of $500 for the purchase of two cows (with calf) is extended in the third year of settlement. The residual "disposable income" provides a good indication of the consumption and savings potential within the community.

Again, it is wise to reiterate the three critical assumptions underlying these estimates:

(1) a rotation system, as indicated, is used so that yields of corn, beans, and rice do not fall in the initial years;

(2) access to markets exists early in the settlement process;

(3) permanent crops such as cardamom and/or pasture and livestock are introduced around the third year of settlement allowing capitalization to take place.

C. Conclusion from Farm Profitability Analysis

1. Income

From the standpoint of the individual farmer, the prospective returns appear quite tood. Discounting the

TABLE No. 19

CREDIT AND DEBT SERVICE REQUIREMENTS

Years:	1	2	3	3d	4	4f	4g	5h	5
Return to land management, risk	208.14	424.97	-236.44	-420.62	676.58	436.8	328.05	741.55	846.64
Credit receipts									
Loan funds (livestock)			500.00	500.00					
Debt payment									
Principle [a]									
Interest			30.00	30.00	60.00	60.00	60.00	60.00	60.00
Disposable Residual	208.14	424.97	233.56	49.38	616.58	376.8	268.05	681.55	786.64

a) principle starts at the seventh year of farm plan.

returns to land and management over a 20 year period at 12 percent yields a net present worth of $4540. It would require a discount factor greater than 50 percent to reduce returns to zero. The disposable income estimates consistently show that achievement of family subsistence requirements and cash income increases can be anticipated.

2. Size of holding

Three objectives seem principle in determining the size of plot: income possibilities, equity considerations, and community facilities. Experience in both the Maryknoll settlement and in La Maquina colonization project indicate that lot sizes greater than 20 hectares may be too large. The Maryknoll community has found the disadvantages of the 20 ha. size to be:

(a) dispersion of the population from the center where services are provided.

(b) inefficient use of land resources - to the settler land does not seem scarce.

(c) large areas of land remain uncultivated.

In La Maquina, settlers were started with 20 has. Now it is found that each plot has been divided at least once, on the average. The income estimates indicate that 7 has. of Class III land allow a better than average income level to be attained along with diversification into livestock and permanent crops. This does not, however, allow much flexibility. Small sized plots allow more persons to be settled on the limited land area available. A small size also enables more families to have plots closer to the urban settlements, thus increasing the spread of the community benefits. National equity considerations also

argue that the plot size be kept to a minimum. A colonization project benefits relatively few persons while a large portion of the rural population remains on plots of less than 2 has. In general, we might consider a minimum size plot to be 7 ha. of Class III land. Where soil quality and topography vary, the minimum may be increased up to approximately 15 has. There are few arguments which would justify plot sizes larger than 15 ha. given income, equity, and spread of community facilities as principl objectives.

3. Extension Services

Because of the variability of conditions under which tropical agriculture takes place, much of the important technical data can only be gathered at the site of settlement. Two principal directions for research are indicated:

(a) Establishment of a rotation system that is straightforward and can be used by the farmer in the initial 1-3 years of the project.

(b) Experimentation on the feasibility of other permanent crops besides cardamom such as vanilla, nutmeg, allspice and citrus.

V. SOCIAL PROFITABILITY OF IXCAN SECTOR DEVELOPMENT

In the previous section, profitability of the individual settler was analyzed. Residual earnings were computed which are available for partial or total payment of settlement costs including roads, surveying, titling and community infrastructure. Even though these settlement costs may not be totally paid by the settlers, since they are costs due to the project they must be considered in determining social profitability of the project. This is essential for purposes of comparing the Ixcan Sector Development with alternative projects.

A. Public Costs

1. Road Construction

Road access is categorized as including (1) primary access, (2) secondary access and (3) farm-to-market center access. (see discussions in Section III on form of area settlement for definitions of road access categories).

The primary road access is assumed to follow essentially the route proposed in the Berger Associates report of the San Juan de las Cuevas-Vértice de Santiago trunk line thru the transversal.

This route is 66.5 kilometers from the Rio Chixoy (kilometer 77.5) to San Ramón (kilometer 144). In the proposed settlement from, primary road access needs to go only as far as the regional center proposed by INTA at San Antonio Tzejá (see "Zona Reyna Colonization Project", 1971), which is approximately 15 kilometers west of the Rio Chixoy. This would reduce the kilometers of primary access road to 51.5. From San Ramón to Nueva Concepción where the road has been extended from Barillas is approximately an additional 10 kilometers. Hence, the total primary access road needed to connect the Ixcan Sector settlement area to Barillas and all external markets is about 61.5 kilometers.

Construction costs for this road will be further estimated by other people. Using the per kilometer construction costs of the Shenandoah project of $65,000 the

estimated primary road access costs are approximately $4 million. Using other estimates as low as $25,000 per kilometer the total cost is about $1.5 million. 1/

Secondary access roads connect the proposed urban service centers with the proposed regional center. These roads are low cost roads sufficient for truck transportation. Approximately 66 kilometers of secondary access roads will be constructed. At a cost of $10,000 per kilometer (as yet unverified) this equals $660,000.

Farm-to market-center access is foot and mule path cleared from the community or village center to the urban service center. For the Ixcan Sector settlement there are proposed to be about 24 communities with an estimated average distance between village and urban service center of 5 kms. This gives an estimated total of farm-to-market-center access paths of 120 kilometers. At an estimated cost of $50 per kilometer (as yet unverified), this is a total cost of $6,000. (Using information from the land clearing activities in the farm budget analysis it requires about 15 man/days per kilometer to clear a path three meters wide. Additional costs are allowed for bridges and stone and gravel fill.)

In summary, total road costs are estimated at from $2,166,000 to $4,666,000. If primary access road costs are to be considered development costs, then only $666,000 of secondary road access and farm-to-market-center foot path access should be recouped from the settler's residual earnings.

1/ The settlement area is about 38 percent of the total Ixcan Sector. If, as a rough approximation, we attribute 38 percent of the primary access road costs to the settlement area this would equal from $0.57 million to $1.52 million.

2. Settlement costs

Settlement costs include surveying, titling and other administrative costs of enlisting and settling people on their parcels. The Maryknoll Fathers charge each family $80 for performing these services. Costs obtained by the Planning Council include $4.86/ha. for surveying the perimeter and $5.83/ha. for surveying individual lots of 30 hectares in size. This is a total surveying cost of $10.69/ha. If we assume a $125 cost per family and 5,549 families the total settlement costs are about $693,625.

3. Community infrastructure

Minimum community infrastructure is proposed for the communities and urban service centers other than what will spontaneously occur during a normal development process. Schools are proposed for each of the communities and urban service centers. Also, a health post is proposed at each urban service center.

Investment costs should be estimated for the minimum proposed community infrastructure. Assuming an investment cost of $2,000 per primary school and $4,000 per health post, the total community infrastructure project cost would be $72,000.

It is not clear as to what part of these community infrastructure costs should be considered project costs and what part is public costs and borne by the national budget. If primary schools and health posts are provided thru out the country then it can be argued that similar investments should be provided in the settlement area. If such investments are not generally provided, then the question is raised as to why treat new settlement areas preferentially.

B. Rate of colonization and flow of infrastructure funds

In previous sections the form and organization of settlement were discussed. The rate of colonization is presented in Table 20. One settlement can be considered to start in each of the land tracts during the first year. This settlement will be considered the urban service center. Eight settlements are started the second year, twelve the third and four during the fourth year. Settlements will build up to the full 200 family level over a period of two or three years.

Primary road access is critical in terms of timing other settlement processes. Access to the regional center of San Antonio Txejá is proposed for the second year. Secondary roads will start out as foot paths from the urban service centers to the regional center. Over a five year period these paths are turned into truck transportable networks using labor intensive construction methods. Farm-to-market-center access paths are constructed as settlement communities come on stream.

Total preliminary costs of project infrastructure is estimated at $2,932,000 for the Ixcan Sector. This is about $522 per settler. If primary access road costs are $65,000 per kilometer then project infrastructure costs are $5,432,000 and cost per settler is about $980.

Present value of public infrastructure discounted at 12 percent is equal to $2,380,424 assuming primary road access cost of $25,000/Km. Present value of infrastructure cost assuming a primary road cost of $65,000/Km. is $4,492,924. Present value cost per settler is from $429 to $810.

Several summary statements should be made concerning public costs of the project:

Table 20 Rate of Colonization and Flow of Infrastructure Funds

Ixcan Settlement Area.

	Year 1	2	3	4	5	Total
Settlements						
Number	4	8	12	4	-	28
Families	400	1,200	2,000	1,600	400	5,600
Rural Population	2000	6, 000	10,000	8,000	2000	28,000
Settlement Costs ($)	347,000	116,000	174,000	57,000	-	694,000
Roads						
Primary access ($) ($25,000/km.)	750,000	750,000	-	-	-	1,500,000
Secondary Access ($) ($10,000/km.)	110,000	220,000	220,000	55,000	55,000	660,000
Farm-to-market Path Kilometers	-	40	60	20	-	120
$ ($50/km.)	-	2,000	3,000	1,000	-	6,000
Urban Infrastructure						
Schools						
No.	-	4	8	12	4	28
$ ($2,000 each)	-	8,000	16,000	24,000	8,000	56,000
Health Posts						
No.	1	1	1	1	-	4
$ ($4,000 ea.)	4,000	4,000	4,000	4,000	-	16,000
Total Cost of Infrastructure ($)	1,211,000	1,100,000	417,000	141,000	63,000	2,932,000
Present Value ($) (12 %)	1,081,423	876,700	296,904	89,676	35,721	2,380,424

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(1) All public infrastructure costs are provisional at this stage. All costs presented should be verified.

(2) Minimum of infrastructure is assumed. The form of settlement is very close to penetration road and spontaneous movement of settlers.

(3) The administrative and organizational structure relies very heavily on the Federations of cooperatives. Recruitment of settlers and agricultural technical assistance is provided by the cooperatives with very little other agency inputs.

(4) The rate of settlement appears to be feasible but project delays in road construction or recruitment of settlers may be a critical factor in project profitability.

C. Social benefits

1. Discounted benefits of producers' residuals

Present value of the summation of all producers' residuals are considered as total project benefits. Table 21 presents the discounted project benefits assuming a discount rate of 12 percent and project life of 20 years. Settlers are assumed to come on stream as shown in Table 20.

TABLE 21 DISCOUNTED BENEFITS OF PRODUCERS RESIDUALS
(12 percent discount rate)

Settlers in year	No. of Settlers	Present value of Producers' residual thru project year 20
1	400	$ 1,815,160
2	1,200	4,663,108
3	2,000	6,570,086
4	1,600	4,357,244
5	400	879,319
Total	5,600	$18,284,915

Total present value of project benefits is equal to $18,284,915 or $3295 for each settler. The social benefit-cost ratio (B/C) ranges from 7.7 to 4.1 depending on cost of the primary access road.

Several assumptions were used in computing the above social benefit-cost ratios:

((a) The entire primary road access costs have been charged to the Ixcan settlement area. Other colonization groups will also benefit from this same road.

(b) Project benefits were computed using current market prices of agricultural products. It is anticipated that no market constraints will lower prices significantly in the near future. However, government policy is presently encouraging food grain production. If commercial producers enter this market to a greater extent (i.e., if world

prices in cotton and sugar were to decline drastically), this would tend to lower prices of food grains.

(c) Family labor has been valued at the subsistence consumption level. If the demand for labor were to increase dramatically in alternative projects and sectors the relative value of the Ixcan settlement project would be reduced significantly. However, this does not seem likely to occur within the next 10-15 years.

(d) The rate of colonization appears to be feasible as detailed in Table 20. However, contingencies have not been allowed for in terms of a slower rate of colonization or for abandonment of parcels by settlers.

2. Increased personal income in the highlands

It is anticipated that as migration of people from the highlands occurs, land resources will be freed up allowing for expansion of present farms or land made available to landless workers. The minimum amount of personal income available for distribution to those remaining in the highlands is equal to the subsistence level of consumption which is valued at $275-$300 per family. This is equivalent to an annual increase in total personal income of $1,525,975 to $1,664,700. For the 93,902 small farms located adjacent to the proposed Ixcan settlement area (Robertson, "Minifundia Problem...") this is an annual increase of $16-18 per farm assuming only those farms receive all of the benefits.

Data from the highlands show that net income per hectare for farms less than one hectare is $400 and for farms of 1-3 hectares is $200 (Robertson, "Minifundia Problem...", page 7). From .8 - 1.0 hectares of land is needed to generate the subsistence level of consumption. A minimum of 4,439 to 5,549 hectares are freed up if all of the migrants come from the highlands.

The increased personal income available for distribution in the highlands should not be counted as additional social benefits accruing from the Ixcan settlement project. To do so would be double counting project benefits equal to the subsistence level of consumption as computed above. What this does is show the distribution of project benefits among those who migrate and those that remain in the highlands.

VI. ORGANIZATIONS AND INSTITUTIONAL ASPECTS

The organizational and institutional aspects of the settlement project may be considered under four categories: recoupment of costs, cooperative activities, community service provision, and regional studies.

A. Recoupment of Costs

Land is a scarce resource in Guatemala. As long as relatively few persons are, at present, going to have the opportunity to increase their ownership of land it is both reasonable and equitable that the costs of community and project services be recouped in the price of land. The present value of community and project services has been estimated as $2,380,424. This total is disaggregated on the basis of services provided in Table 22. Each service component is put on a cost per family basis. Assuming each family has seven hectares of Class III land, an average charge per hectare for the agricultural land by service component is estimated.

TABLE 22 PRESENT VALUE OF SERVICE COMPONENTS AND AVERAGE LAND CHARGE

Component	Present Value	Present Value/ Family	Ave. land Charge/ha.
Settlement	$ 562,463	$ 101.	$ 14.
Farm/Market Access	4,366	1.	(.14)
Secondary Access	496,375	89.	13.
Community Infrastructure	49,720	9.	1.
Primary Access[a)]	1,267,500	228.	33.
Primary Access[b)]	481,650	87.	12.
Total [a)]	2,380,424	429.	61.
Total [b)]	1,594,574	287.	40.

a) Attributes total cost of primary access to the project.

b) Attributes only 38 per cent of the cost of the primary access road to the project.

Depending on the allocation of primary road costs to the project, a land charge of $40 to $61 per hectares of Class III land may be considered. Given the projected income estimates this is not an unreasonable charge. However, other private and government settlements charge considerably less per hectare. A second aspect to land pricing is the demand for land expressed by the cooperatives. The cooperative administration may be able to give and idea of the response of their membership to various price suggestions. Also the pricing mechanism can be flexible. For example, land in the center may be priced higher than more distant land - though not by so much as to discourage central location of the settlers. A pricing system that allows the price of land to rise over time, or a taxing mechanism which captures additions to the value of land over time, may also be considered. Within the central locations some taxing method is required to begin to support the expansion of services in water, sanitation and power.

There may be a reluctance to charge the settler for his land. This may reflect the traditional "Patron" stance of government agencies or a belief that, after years of subsistence living, the "campesino" is due a windfall. Were the opportunity for more land open to all, the equitability of such a windfall is attractive. When, however, only relatively few are to be given the opportunity, economic and equity considerations argue for a land charge that works towards recovering project costs as outlined above.

B. Cooperative Activities

The precise nature of the relationship between the cooperative federations and the GOG have not been fully specified as yet. What is foreseen in the Planning Council discussions is that:

1. Further titling and land distribution activities by INTA (Instituto Nacional de la Transformación Agraria) within the Franja Transversal will be prohibited.

2. Legislation enabling cooperative associations access to the use of land in particular areas for the purpose of colonization will be forthcoming. A "convenio" delineating areas of government authority, planning office and cooperative responsibilities toward national agencies and the settlers is anticipated within the working document at the Planning Council. Such a convenio will establish a process within which areas of authority and responsibility can be defined as particular situations arise.

The activities of the Cooperative Federations and their affiliates may be delineated along three lines: movement of settlers to sites, aspects of site preparation, and service provision at the site immediately and over time.

Once given access to a settlement area, the Cooperative Federation, based on the analysis herein provided, will know approximately the number, location, and size of communities for which it will be responsible. The service requirements of the different sized centers is indicated as well as a reasonable rate of settlement growth. On this basis it can estimate its own administrative requirements, and select affiliated cooperatives who have the necessary administrative capacity, financial capacity, and membership growth to participate in the settlement project. Not all cooperatives will have the capacity to contribute to the initial settlement activities.

The Federation in conjunction with the selected cooperatives will present the settlement plan and an orientation to the economic and agricultural prospects and problems to the membership. As interest is expressed, recruitment of settlers begins. Recruitment is not necessarily limited to cooperative members. Recruitment should, however, be directed towards the landless and small landholders (say those with less than 5 manzanas) in regions characterized by a concentration of munifundia - principly the North and West regions. Personal characteristics such as hard work and special skills such as carpentry may also

be given weight in the recruitment process. It may be necessary to facilitate the transportation of settling families to the region. Very roughly, this has been anticipated in the cost of settlement estimates and can be recouped in the price of land.

The cooperative activities within the category of site preparation involve: (1) having ready the administrative and organizational facilities and manpower to provide basic services, and (2) a plan for the site and spatial organization of the urban center. The latter is flexible of course - this is not a city plan but a location of the site, the extent of its area, and an administrative facility for those in charge.

The minimum essential facilities involve a surveying & titling capacity (both for access path construction and for distribution of parcels) a facility for health screening, orientation and limited treatment, a capacity to begin work on basic public works (access paths, school construction).

Titling: the form of holding foreseen is that of private title. It is important that the migrating family be secure in its holding as quickly as possible. If permanent titling cannot be so quickly secured a form of provisional agreement between the cooperative federation and the settler may be useful. This would simply state that the settler cannot be deprived of his holding or the value of the improvements made there on except under specified conditions and for which just compensation must be paid. Title may be restricted as to uses and sale.

Health: for the provision of health services and facilities the Ministry of Health should be brought into discussions at an early date. This would allow projected

expenditures to be incorporated into their budgeting process and prevent last minute complications in the delivery of health services.

Surveying: INTA or a private engineering firm can be contacted to train a group of cooperative members in surveying techniques. Surveying of the perimeter will probably require the use of licensed surveyors. However, if titles are not given to individuals of the cooperative it may be sufficient to use trained cooperative personnel for surveying the parcels and the access path. The Maryknoll colonization has experience in this.

Public Works: public works employment in access path, secondary road clearing, the community facility construction is seen as a substitute for a "grubstake". Employment activities must, however, be ready to begin as the settlers arrive. Delays in implementation of the program would likely lead to the necessity of "grubstaking" through a loan or grant. The Department of Roads should be brought in on this to gain experience in labor intensive road construction techniques. If it is left to the cooperative alone, then the experience gained cannot be carried over to other settlement areas.

Over the long run, the coop activities will be oriented towards agricultural services (input supplies and marketing) and some consumer services (store, savings and loan). For these sorts of services, the cooperative is expected to function as any other business: those who use the marketing facilities pay the cost of providing the service. The costs associated with settlement have been very generally accounted for in the price of land.

There may be land areas in the region which because of soils and topographic conditions are suitable only for permanent crops. These lands should be identified and their use appropriately restricted by the cooperative and ICTA.

The land then may be rented or sold under specific provisions regarding its use. The determination, however, of what land is suitable for agricultural uses is not solely a technical datum. It depends also on product prices, input costs, and the availability and ingenuity of labor. Thus flexibility in defining these areas is required.

It has also been suggested, as one alternative, that the cooperative administer the use of these lands in a more direct fashion: that, in short, the cooperative manage a "cooperative finca" on which community members labor. Such a venture seems unprofitable. The coops have no experience in farm management. Labor constraints may make labor costly. It is likely more efficient to allow the farmer to do the production activities while the cooperative concentrates on providing the storage, processing, and marketing facilities which enable the small farmer to realize the benefits of producing permanent crops.

C. Community Infrastructure Activities

The distribution of health facilities and their growth over time is outlined in the paper. At this point, it is sufficient to recognize that the Ministry of Health must be brought into the discussions so that their contribution (financial and technical) can be incorporated into the planning process. To the extent that members of the community can be provided training as midwives, promotores, auxiliary nurses, and health technicians, it is to be encouraged.

The distribution and growth of educational facilities is also outlined in the paper. Again the resources of the Ministry of Education must be incorporated at the planning stage in the project development. To not bring them in at an early stage is to invite delays and frustration in implementation.

The primary access road is of critical importance to the immediate feasibility of the project and its long run success. The project provides an excellent opportunity for the Department of Roads to gain experience in labor intensive construction techniques that can be applied elsewhere. Assistance which enables progress in this road to proceed more rapidly is probably necessary. The road standards may be improved in a stage-like sequence as the volume of traffic grows over time.

ICTA has a number of functions that should be considered. First, ICTA will be in part responsible for identifying those tracts of land which are not suitable for annual crop activities. Second, experimentation in rotation systems and land use practices which substitute for land expansion as a means of maintaining or increasing yields, should be pursued. Thirdly, diversification into permanent crops such as spices is likely to have a high payoff in this region. Research on these possibilities can contribute to effective resource use and income objectives. This should be coordinated with technical assistance services. The distribution of assistance services is mentioned in the paper.

D. Regional Studies

Further regional studies are incorporated within the auspices of the Planning Council. Whether the studies be directed towards the entire Franja Transversal or in some very limited way is under discussion. Limiting general resource studies may be desirable given limited resources and the costs of such studies. The initial resource study done by R. Perdomo has provided a fairly clear idea of soil characteristics, topography, and land tenancy. Further studies should focus on areas of likely development. Once identified, land tenancy and soil surveys would be useful. Another direction of study is the feasibility of extending road access to the Sebol region and=or to Rubelsantos.

VII. CONCLUSION

What is provided in this paper is an economic, financial, and spatial framework around which a detailed plan of settlement may be constructed. The colonization project is viewed in terms of the spatial and economic development of the Western section of the Franja Transversal over time. It is also in the nature of a pilot program to demonstrate the feasibility of a quasi-directed minimum infrastructure settlement project which can be duplicated on different scales elsewhere in Guatemala. The estimates of income, employment, and contribution to GNP indicate that it stands on its own as a project component in a more general development program.

A N N E X I

LIVESTOCK ENTERPRISE DATA

Table 1. Alternative Livestock Assumptions with Pasture Requirements

Alternative I: 2 bred cows with credit, replacement of culled cows only from own herd, only cull females sold. Steers sold after 4 years (Based on Tables 6 and 7).

End of Year	1	2	3	4	5	6	7	8	9	10
Item										
Animal Units	2.3	2.3	2.5	2.8	3.3	3.2	3.2	3.3	3.4	3.4
Ha. needed (2 Av. ha	1.2	1.2	1.3	1.4	1.7	1.6	1.6	1.7	1.7	1.7

Alternative II: 2 bred cows with credit first year, 1 more cow with credit second year, replacement from herd, only cull females sold. Steers sold after 4 years. (Based on Tables 6 and 7)

End of Year Item	1	2	3	4	5	6	7	8	9	10
Animal Units	2.3	3.4	3.7	4.1	4.7	4.9	4.8	4.9	5.1	5.1
Ha. needed (2 Av/ ha),	1.2	1.7	1.9	2.1	2.4	2.5	2.4	2.5	2.6	2.6

Alternative III: 2 bred cows first year, 1 more cow second year, no culling (or culled cows replaced) steers & 50% of heifers sold after 2 years. Cow death loss replaced (Based on Table 8).

End of Year Item	1	2	3	4	5	6	7	8	9	10
Animal Units	2.3	3.8	4.6	5.1	5.4	5.8	6.3	6.8	7.3	7.8
Ha. needed (2 Av./ha)	1.1	1.9	2.3	2.6	2.7	2.9	3.1	3.4	3.6	3.9

Table 3. Milk and Meat Production and Value Estimates for Alternative III per Farm

Year / Item	1	2	3	4	5	6	7	8	9	10
ilk Lts. a/	720	1080	1080	1142	1235	1329	1427	1534	1648	1771
" value 10/lt)	Q 72	108	108	114	123	133	143	153	164	177
Value kt. beef b/			94	142	142	160	162	174	187	201
	72	108	202	256	265	283	305	327	351	378

a/ 360 liters per cow per year (allows for dry cows, calf sucking)

b/ culled 2-yr. heifers and 2-yr. steers valued at Q150/head

Table 2. Value of Milk and Meat Production Estimates for Alternative I per Farm

Year / Item	1	2	3	4	5	6	7	8	9	10
Milk value a/	Q72	97	82	83	87	87	89	90	92	94
Beef value b/					72	96	82	82	88	90
All cows heifers c/	30	39	39	40	40	40	44	45	45	45
	102	130	121	123	199	223	215	217	225	229

a/ 360 liters per cow per year (allows for dry cows, calf sucking)

b/ Q200 per head at 4 years of age.

c/ Q150 per head (average for culled cows and 2-yr heifers).

Table 4. Estimated Costs and Returns for Alternative I (Based on Tables 6 and 7)

Item \ Year	1	2	3	4	5	6	7	8	9	10
Gross Income a/	102	136	121	123	199	223	215	217	225	229
Medicines b/	6	6	6	7	8	8	8	8	9	9
Other Costs c/	3	3	4	4	5	5	5	5	5	5
Ins. d/	20	10								
Cash costs	29	19	10	11	13	13	13	13	13	13
Net return	73	117	111	112	186	210	202	204	212	216
Home milk use e/	36	48	41	41	42	42	44	45	46	47
Disposable	37	69	70	71	144	168	158	159	166	169
Loan prin. f/					50	50	100	100	100	100
int.	30	60	60	60	90	54	48	36	24	12
Net income	7	9	10	11	4	64	10	23	42	57

a/ See Table 2 for details of gross income.
b/ Assumed at Q2.50 per A.U.
c/ Minerals and misc. at Q1.50 per A.U.
d/ Death insurance covers full loss first year and 50% second year.
e/ Assumed one-half of milk consumed in home.
f/ Loan on 2 cows, Q200 each, plus Q100 for fencing, at 12% for 10 years. Payments begin first year on interest and fifth year on principal.

MINIFUNDIA PROBLEM AND MAN/LAND RATIOS FOR SMALL FARMS IN GUATEMALA

Summary

Minifundia is a major problem in Guatemala. Of the 417,344 farms in Guatemala in 1964, 20 percent had less than 1 manzana 1/ and 75 percent had less than 5 manzanas. About 30 percent of these farms are located adjacent to the proposed colonization area.

Man/land ratios are very high for the two smallest farm size groups. Those farms with less than 1 manzana have 15-17 persons per hectare in the farm; those farms with less than 5 manzanas have 4-6 persons per hectare in the farm.

Farm and per capita net income for these families is very low. Net farm income for farms with less than 1 manzana averages from $148 to 172; for farms with less than five manzanas the average ranges from $224 to 300. On the average per capita net income on farms with less than 1 manzana ranges from $9 to 12; on farms with less than 5 manzanas the average ranges from $38 to 82.

Opening new land would permit some of these farmers to move off the crowded land base and into new areas that would permit them to substantially improve their level of living and contribution to GNP.

Data Base

The data on farm numbers and farm size come from the 1964 Guatemala Agricultural Census. This is the most recent complete

1/ One manzana equals about .6987 hectares.

2/ Daines, Samuel R. Guatemala Farm Policy Analysis. "The Impact of Small-Farm Credit on Income, Employment and Food Production." AID. Washington, D.C., April, 1975.

set of data on the distribution of farm size. It should be stressed that the averages calculated from these data will be larger than the actual farm size due to land losses from erosion and that the numbers of farms in each category will be larger due to population growth and fragmentation of holdings during the last decade. (For example, land in farms declined by about 7.3 percent while the numbers of farms increased 19.7 percent from 1950 to 1964.)

The averages of land/man ratios are calculated based on average numbers of persons per farm by farm size and/or region as estimated from 1974 survey data . 2/

2/ Daines, Samuel R. Guatemala Farm Policy Analysis. "The Impact of Small-Farm Credit on Income, Employment and Food Production." AID. Washington, D.C., April, 1975.

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Magnitude of Minifundia

Minifundia is a major problem in Guatemala. According to 1964 Census data 75 percent of the 417,344 farms in Guatemala had less than 5 manzanas; 20 percent had less than 1 manzana. The distribution of these farm size groups (farms with less than 0.1 and 3.5 hectares) is given by zone as defined in the 1964 Census in Tables 1 and 2. So that the reader may have an understanding of the geographic relationships, the same data are presented in Maps 1, 2 and 3. The two zones with the largest numbers of small farms are contiguous to the proposed colonization area, the Transversal Strip. Table 3 gives the same information by department.

TABLE 1 NUMBER AND PERCENT OF FARMS OF LESS THAN 5 MANZANAS BY ZONE; GUATEMALA

Zone	# Farms	%	Area in Manzanas	Ave. Size(Hect)
North	65904	21.1	142911	1.52
West	137993	44.1	220566	1.12
Central	41579	13.3	76793	1.29
South	25687	8.2	43075	1.17
East	41703	13.2	86160	1.44
National	312866	100.0	569505	1.27

TABLE 2 NUMBER AND PERCENT OF FARMS LESS THAN 1 MANZANA BY ZONE; GUATEMALA

Zone	# Farms	%	Area in Manzanas	Ave. Size(Hect)
North	9693	11.4	5932	0.42
West	55816	65.6	29764	0.37
Central	8450	9.9	4514	0.37
South	6488	7.6	3602	0.39
East	4636	5.4	2871	0.43
National	85083	99.9	46683	0.38

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TABLE 3 AVERAGE FARM SIZE BY ZONE AND DEPARTMENT ; GUATEMALA

	Farm Size						
	0-1 M		1-2 M		2-5 M		
	Ave. Size in Hect.	% of Total	Ave. Size in Hect.	% of Total[1]	Ave. Size in Hect.	% of Total[1]	Ave. Farm Size in Hect.
Central Zone	(0.37)	(15.9)	(0.91)	(43.1)	(2.00)	(78.1)	(6.53)
Guatemala	0.35	17.0	0.86	46.4	1.91	80.4	7.61
Progreso	0.50	6.9	1.02	26.9	2.14	66.7	10.45
Sacatepequey	0.37	18.8	0.92	47.9	1.99	84.3	3.55
Chimaltenango	0.38	16.7	0.93	43.8	2.03	77.6	5.56
South Zone	(0.39)	(18.3)	(0.89)	(44.6)	(1.95)	(22.4)	(19.13)
Escuintla	0.38	22.9	0.87	45.0	1.93	70.0	25.64
Santa Rosa	0.40	14.0	0.90	44.3	1.98	74.7	13.01
North Zone	(0.37)	(9.9)	(1.00)	(31.3)	(2.17)	(67.3)	(9.76)
Quiché	0.43	12.9	1.01	31.4	2.21	61.5	6.53
Bajo Verapaz	0.41	8.4	0.92	28.9	2.02	68.6	9.75
Alta Verapaz	0.44	9.0	1.02	34.1	2.08	71.9	11.52
Petén	0.33	2.7	1.14	22.3	2.33	69.5	6.32
Izabal	0.38	4.7	0.84	28.2	2.01	69.9	17.10
West Zone	(0.37)	(32.4)	(1.00)	(54.9)	(2.17)	(80.0)	(5.60)
Sololá	0.38	32.3	0.99	60.3	2.15	87.8	2.41
Totonicapan	0.33	48.7	0.99	70.6	2.15	89.6	1.64
Quezaltenango	0.37	42.7	1.00	65.8	2.20	85.4	4.87
Suchitepequez	0.34	51.5	0.92	72.6	1.98	85.3	11.49
Retalulen	0.40	44.0	0.97	67.4	2.07	81.3	13.14
San Marcos	0.40	24.4	1.01	45.9	2.23	75.8	4.92
Huehuetenango	0.41	14.8	1.06	36.6	2.18	70.2	5.97
East Zone	(0.43)	(7.9)	(0.92)	(33.1)	(2.01)	(71.0)	(8.51)
Zacapa	0.47	7.6	1.92	30.5	2.05	62.6	24.71
Chiquimula	0.42	8.5	0.89	35.8	1.99	74.1	5.52
Jalapa	0.46	9.9	1.00	36.0	2.06	76.7	7.47
Jutiapa	0.42	6.3	0.88	30.2	1.97	68.1	8.58
National Ave.	0.38	20.4	0.97	43.9	2.09	74.9	8.25

[1] Accumulative

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There are over 85,000 farms of less than 5 manzanas in the area contiguous to the Transversal Strip and over 14,000 of these have less than one manzana. These numbers represent 27 and 34% of the total number of farms in each respective class. The average size of these farms is very small. The range is from 0.38 to 1.53 hectares. The relationship by departments contiguous to the Transversal Strip is shown in Map 4.

The concentration of small farms by size group and region is given in Table 4 and Map 5.

TABLE 4 CONCENTRATION OF SMALL FARMS BY SIZE GROUP AND ZONE; GUATEMALA

Zone	Total Land in Farms (manzanas)	% of Land in Farms	% Farms Less Than 1 Manzana	% Farms Less Than 5 Manzanas	[1] R_1	[2] R_2
North	1361250	26.6	11.4	21.1	0.41	0.76
West	1381646	28.0	65.6	44.1	2.34	1.58
Central	497427	10.1	9.9	13.3	0.98	1.32
South	971528	19.7	7.6	8.2	0.39	0.42
East	714915	14.5	5.4	13.3	0.37	0.92
Total	4926766	99.9	99.9	100.0	-	-

[1] Ratio of % Farms of less than 1 manzana divided by % of land in farms.

[2] Same as above except for farms with less than 5 manzanas.

The data in Table 4 is used to illustrate the concentration of farms in the two groups by zone. Map 5 shows these relationships by zone and location with respect to the area to be colonized. The columns R_1 and R_2 measure the relative concentration of those farms with less than 1 and less than 5 manzanas respectively. The greater the R value, the greater is the concentration of small farms within the area. Note that the Western Zone has the highest concentration of both farm size groups or equivalently the most severe minifundia problem. The Central Zone has the second most severe problem, the Northern Zone which is also contiguous to the area to be opened is third in rank. The Southern and Eastern Zones have the lowest minifundia problem. Table 5 and Map 6 show the same data by department.

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TABLE 5 CONCENTRATION OF SMALL FARMS BY DEPARTMENT; GUATEMALA

	% Land Base	% < 1	% < 5	R_1	R_2
Guatemala	3.75	3.4	4.14	0.91	1.10
El Progreso	2.07	0.5	1.57	0.24	0.76
Sacatepequez	0.84	1.8	2.13	2.14	2.54
Chimaltenango	3.42	4.2	5.26	1.23	1.54
Escuintla	12.80	4.6	3.73	0.36	0.29
Santa Rosa	6.91	3.0	4.24	0.43	0.61
Sololá	1.10	6.0	4.15	5.41	3.78
Totonicapan	1.08	13.0	5.98	12.01	5.54
Quezaltenango	3.67	13.0	6.64	3.55	1.81
Suchitepequez	5.13	9.3	3.75	1.81	0.73
Retalhuleu	4.02	5.4	2.49	1.36	0.62
San Marcos	5.79	11.6	10.09	2.01	1.74
Huehuetenango	7.23	7.3	9.01	1.00	1.37
Quiché	7.08	5.7	8.28	0.81	1.17
Baja Verapaz	3.91	1.4	3.17	0.36	0.81
Alta Verapaz	12.55	3.9	8.91	0.31	0.71
[illegible]	0.42	0.1	0.56	0.24	1.33
[illegible]al	3.65	0.4	1.64	0.11	0.45
[illegible]	[illegible]	0.6	1.48	0.18	0.41
[illegible]tala		1.7	4.07	0.62	1.48
[illegible]		1.5	3.12	0.54	1.23
Jutiapa	[illegible]	1.6	4.77	0.30	0.89

Man/Land Ratio

The man/land ratio for these two farm size groups is very high. Tables 6 and 7 present the estimated ratios. The survey data for Table 6 corresponded quite closely to the census data therefore ratios were estimated from regional averages. The estimates for farms with less than 1 manzana [illegible] the survey average for that farm size class. An [illegible] available for the less than 5 manzanas farms indicate that the average number of persons per farm by zone is relatively constant. The average number of persons per farm for farms less than 5 manzanas ranges from about 5-7; for farms less than 1 manzana the average is 6.28. On a hectare basis the ranges vary from about 4-6 and 15 to 17 persons for farms with less than 5 and 1 manzana respectively.

TABLE 6 AVERAGE NUMBER OF PERSONS PER HECTARE AND PER FARM BY ZONE ON FARMS WITH LESS THAN 5 MANZANAS; GUATEMALA

Zone	Average Farm Size (Hect.)	Average # Persons per Farm[1]	Persons/Hect.
North	1.50	5.46	3.64
West	1.12	6.60	5.89
Central	1.29	5.46	4.23
South	1.17	6.89	5.88
East	1.44	6.15	4.27

[1] Based on 1974 Survey data.

[illegible] NUMBER OF PERSONS PER HECTARE BY ZONE [illegible] FARMS WITH LESS THAN 1 MANZANA; GUATEMALA

Zone	Average Size (Hect.)	Average # Persons Per Hectare[1]
North	0.41	15.32
West	0.37	16.97
Central	0.37	16.97
South	0.39	16.10
East	0.43	14.60

[1] Based [illegible] ey Data.

The data in Tables 6 and 7 indicate that the smallest farm size groups (less than 5 manzanas) have an excessively large number of persons per hectare and point out the need for a program to aid these farmers expand their land. These averages are given on Map 7 to indicate the relationship by zone to the Transversal Strip.

Net Income of Small Farms

The 1974 survey data indicated that the average net income per hectare for farms of less than 1 hectare and 1-3 hectares was $400 to $200 respectively. Applying these estimates to the above data, average farm and per capita net income would have the following ranges:

	Net Income	Per Capita Net Income
farms with less than 1 manzana	$148-172	$ 9-12
farms with less than 5 manzanas	$224-300	$38-82

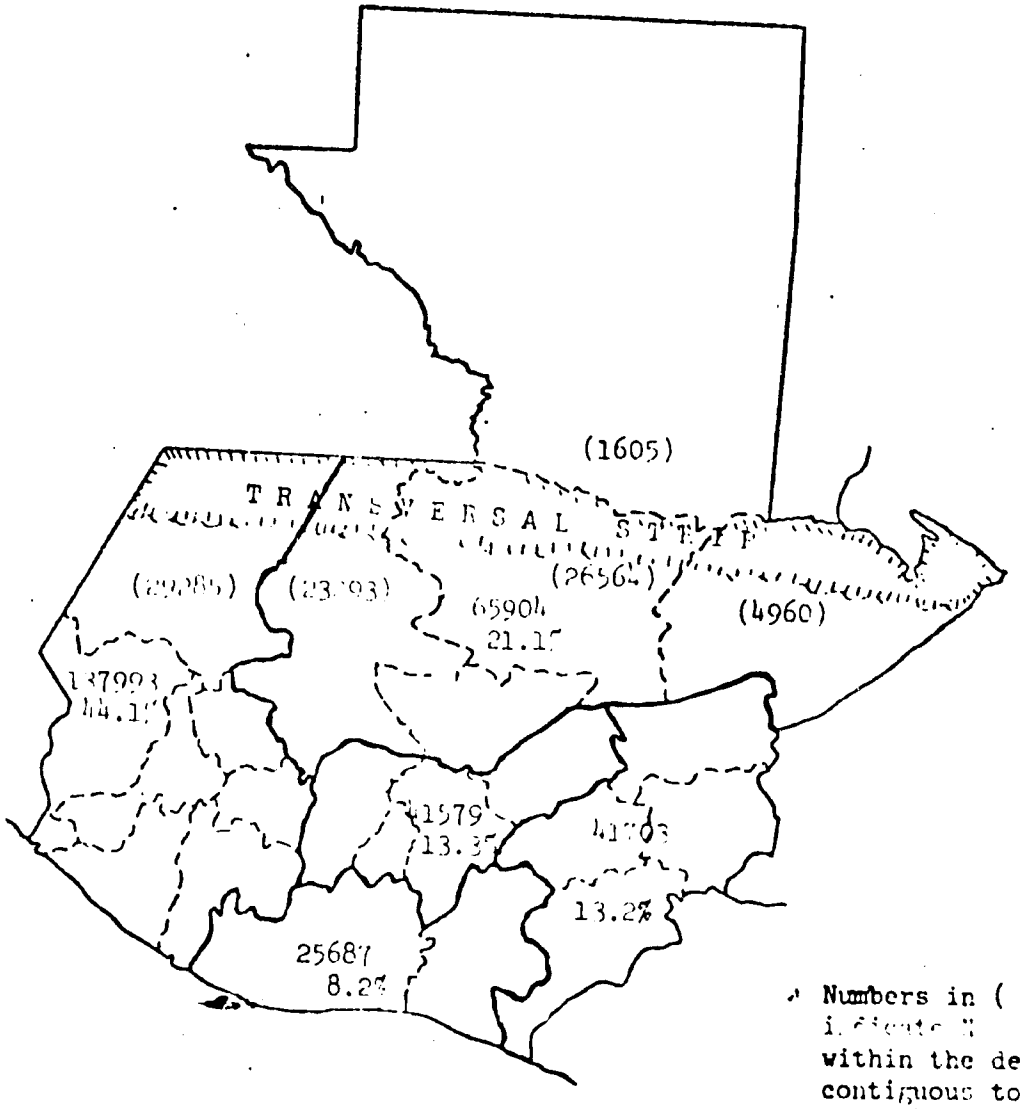
This implies that 20 percent of the farmer units earned only $9-12 net per capita and 75 percent of the total farm units earned between $38 and 82 net per capita.

New Land a Possible Partial Solution

Given the existance of a large quantity of land that can be colonized that is adjacent to the area with the highest concentration of small holdings, a colonization program would appear to be a step in the right direction. Colonization is currently taking place along the frontier which indicates that it is feasible.

Thyrele Robertson
Leader
Sector Analysis Internalization Group
Foreign Development Division

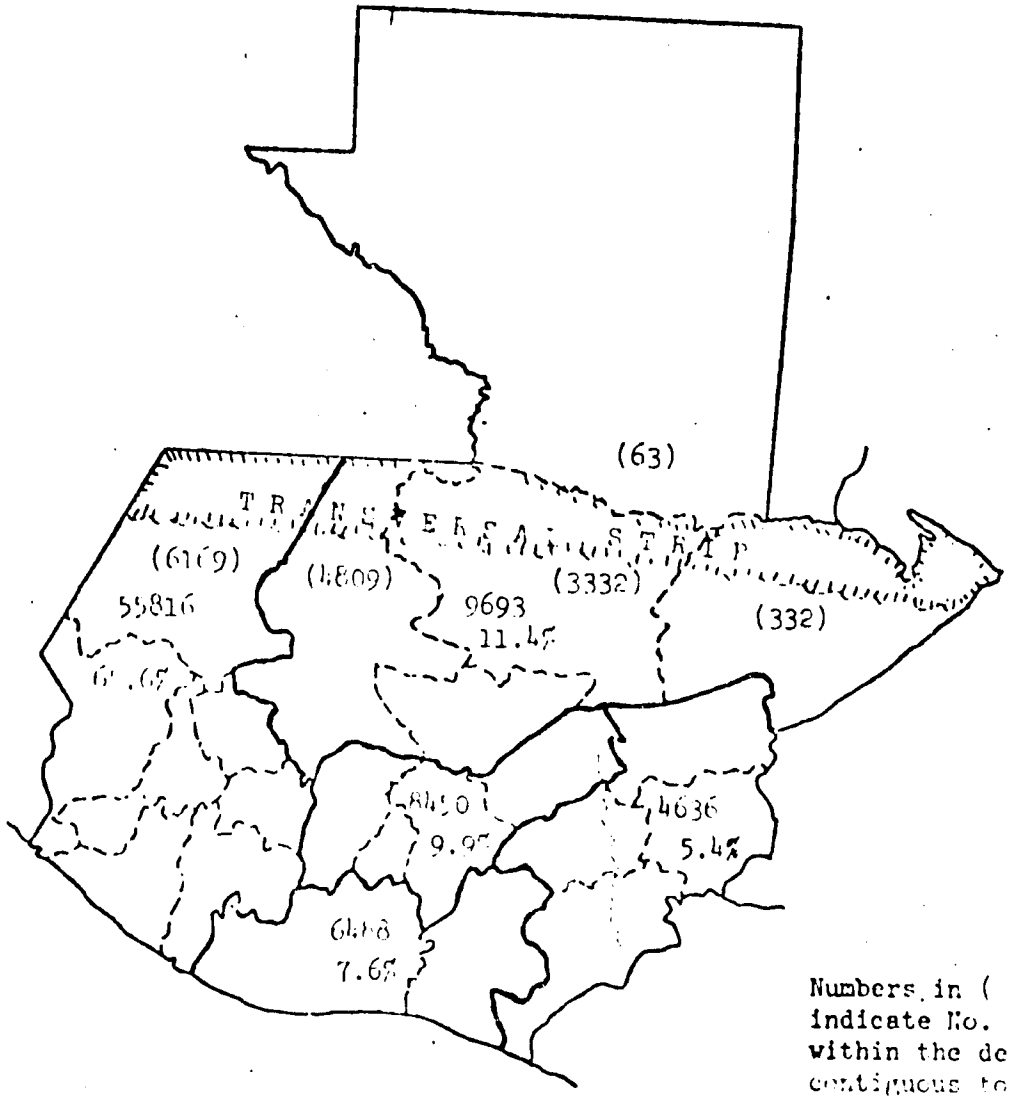
MAP #1 NUMBER AND % OF FARMS LESS THAN 5 MANZANAS BY ZONE: GUATEMALA



Numbers in ( ) indicate [illegible] within the departments contiguous to the transversal strip.

Source: Guatemala Ag. Census 1964

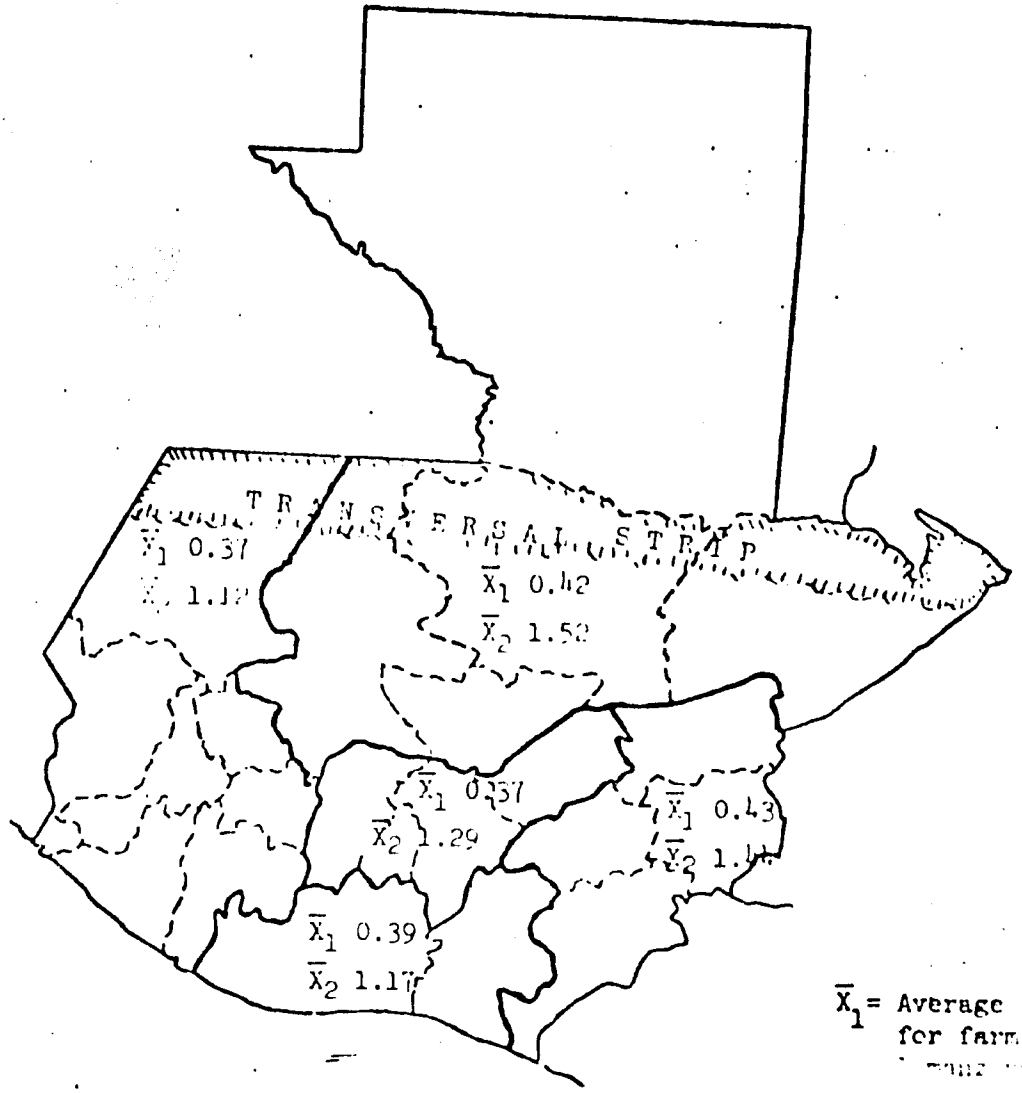
MAP #2 NUMBER AND % OF FARMS LESS THAN 1 MANZANA BY ZONE ; GUATEMALA



Numbers in ( ) indicate No. farms within the departments contiguous to the transversal strip.

Source: Guatemala Ag. Census 1964

MAP #3 AVERAGE FARM SIZE IN HECTARES OF SMALL FARMS BY ZONE; GUATEMALA

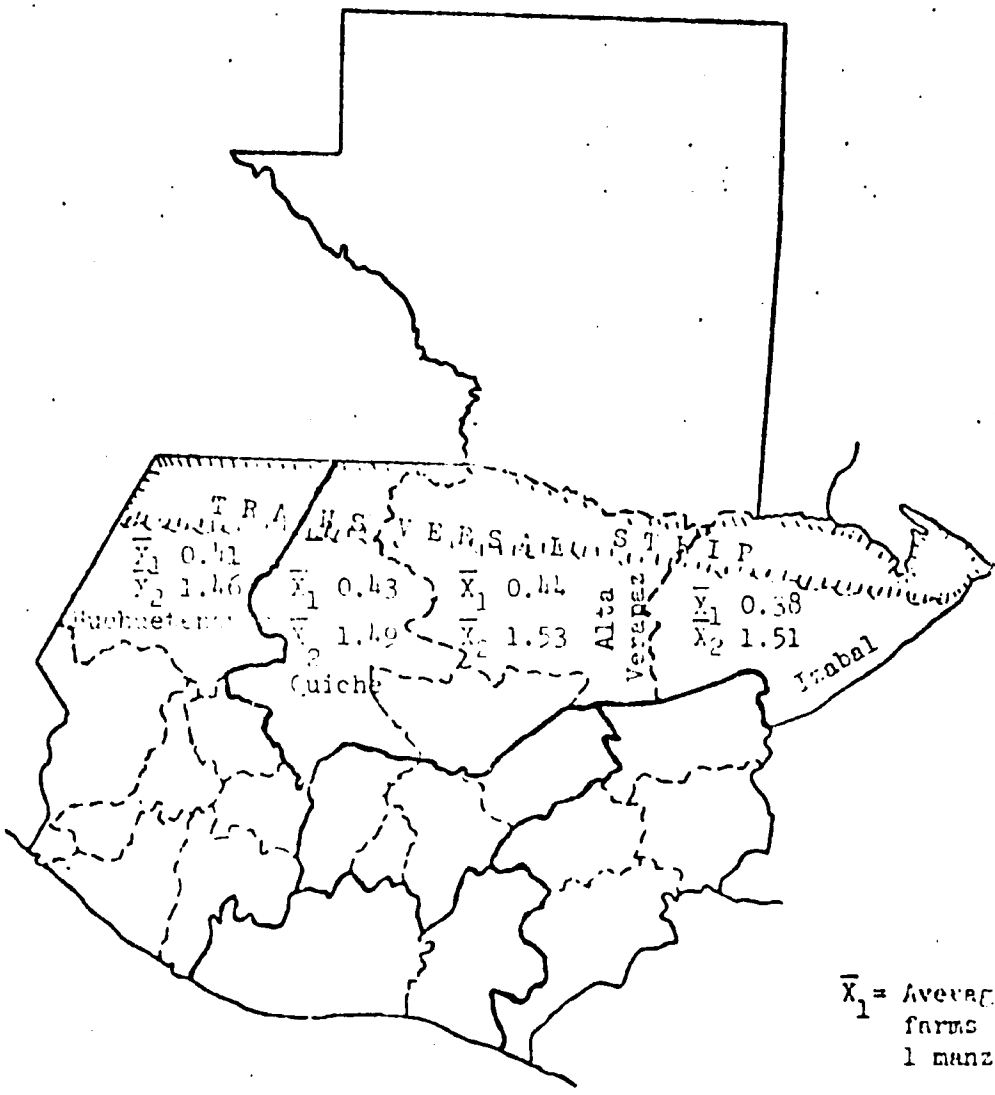


$\bar{X}_1$ = Average in Hectares for farms less than [illegible]

$\bar{X}_2$ = Average in Hectares for farms less than 5 manzanas.

Source: Guatemala Ag. Census 1964

MAP #4 AVERAGE SIZE OF SMALL FARMS IN DEPARTMENTS CONTIGUOUS TO THE TRANSVERSAL STRIP ; GUATEMALA

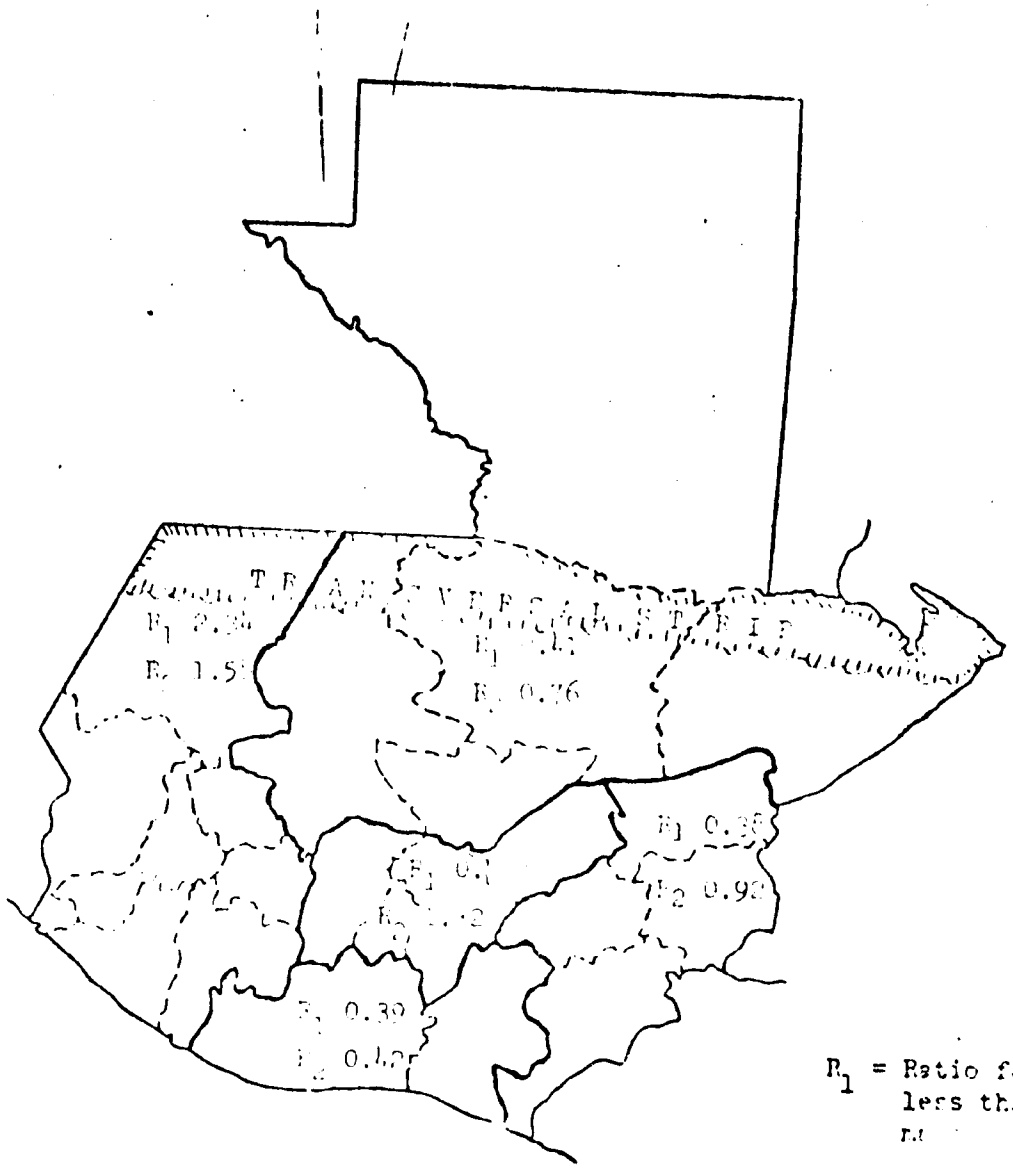


$\bar{X}_1$ = Average hect/farm for farms with less than 1 manzana

$\bar{X}_2$ = Average hect/farm for farms with less than 5 manzanas

Source: Guatemala Ag. Census 1964

MAP #5 INDEX OF CONCENTRATION OF SMALL FARMS BY ZONE; GUATEMALA



R_1 = Ratio for farms less than 1 ha

R_2 = Ratio for farms less than 5 manzanas

Source: Data from 1964 Ag. Census Guatemala

Note: An index of 1.00 indicates that the percent of farmers in that size group is equal to the percent of land in farms. A number greater than 1.00 indicates that there is a higher than average concentration of farms in that particular size group.

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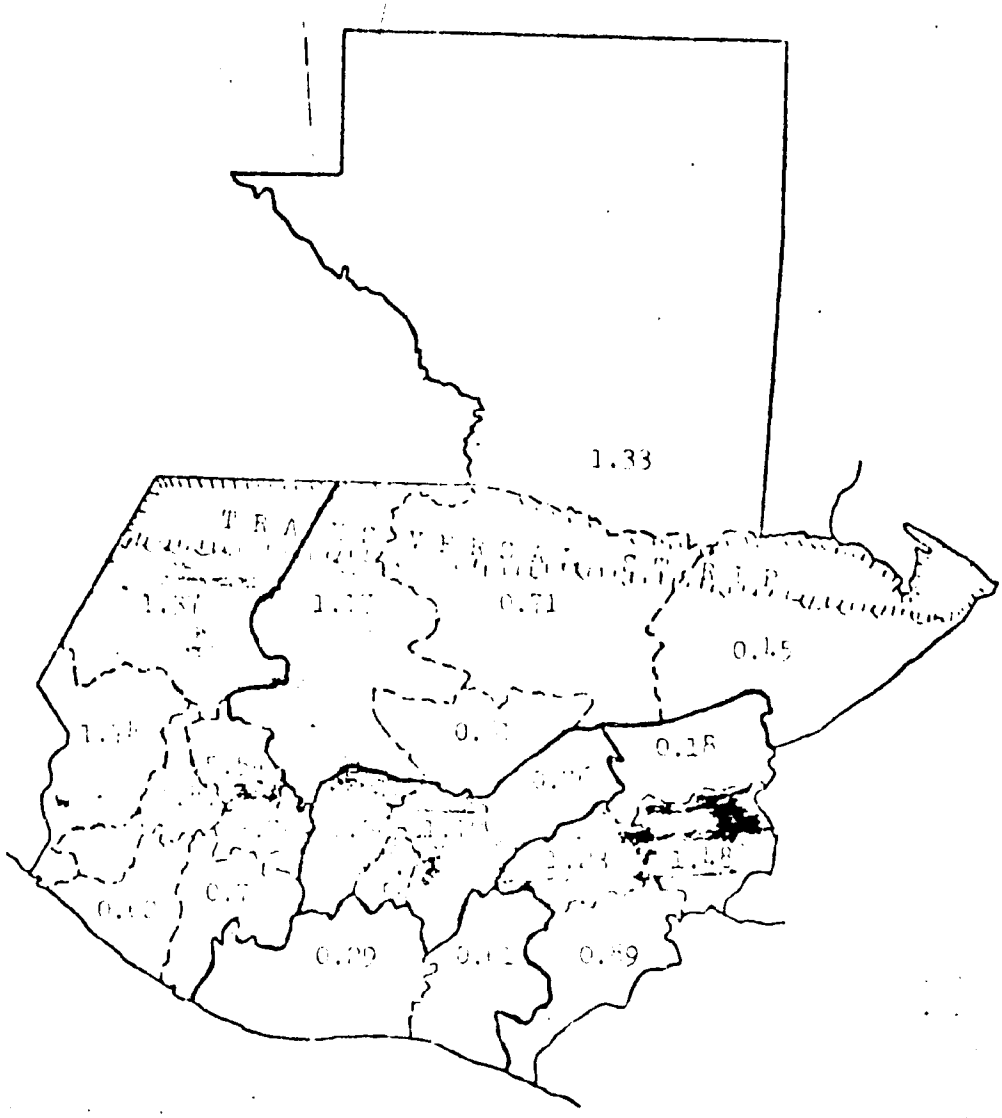
MAP # 6 CONCENTRATION OF FARMS < 5 MANZANAS BY DEPARTMENT; GUATEMALA

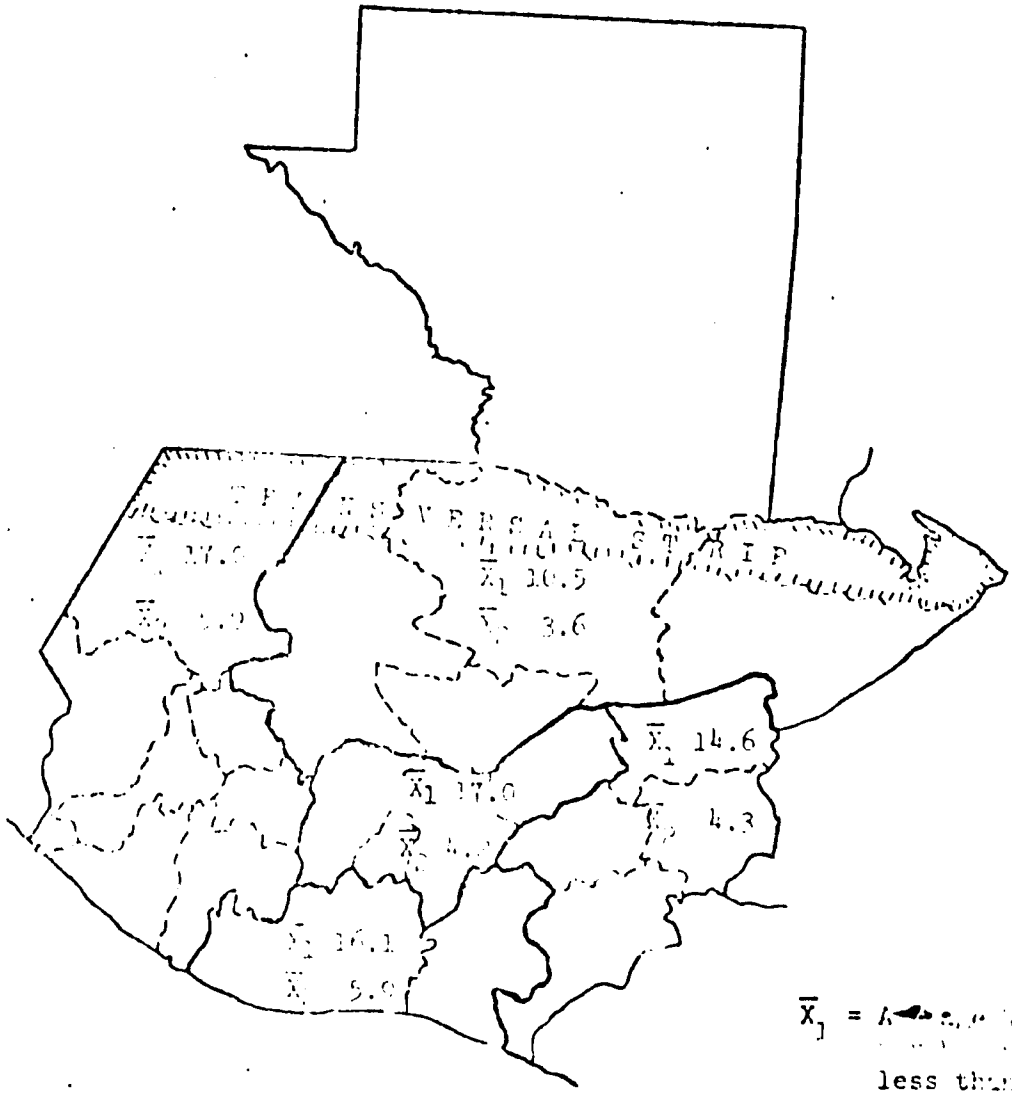


Source: Guatemala Ag. Census 1964.

Shaded area indicates areas that have a higher than average concentration of farms of less than 5 manzanas.

MAP #1 NUMBER OF PERSONS PER HECTARE ON SMALL FARMS [illegible]

BEST AVAILABLE COPY



$\bar{X}_1$ = Average No. of persons [illegible] less than 1 [illegible]

$\bar{X}_2$ = Average No. of persons per hectare on farms less than 5 manzanas

Source: Guatemala Ag. Census 1964 and 1974 survey data

UNCLASSIFIED

Exhibit 5
Page 1 of 44

GUATEMALA CROP PROFITABILITY ANALYSIS

Draft Report

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August, 1975

Secretarial Assistance
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TABLE OF CONTENTS

Page

1 INTRODUCTION 1

2 SUMMARY OF CONCLUSIONS 3

3 METHODOLOGY 4

3.1 DISAGGREGATION OF CROP ACTIVITIES 4

3.1.1 REGION AND FARM SIZE DISAGGREGATION 4
3.1.2 ALTERNATIVE TECHNOLOGY LEVELS 5

3.2 CALCULATION OF CROPPING ACTIVITY COEFFICIENTS 10

3.2.1 DEFINITION OF VARIABLES 11
3.2.2 PRICES USED IN CALCULATIONS 13

4 PROFITABILITY ANALYSIS 15

4.1 PROFITABILITY ACROSS CROPS 18

4.2 PROFITABILITY ACROSS REGIONS 22

4.3 PROFITABILITY BY CROP 22

4.3.1 CORN 23
4.3.2 WHEAT 28
4.3.3 CORN AND BEANS 32
4.3.4 CORN AND SESAME 32
4.3.5 CORN AND SORGHUM 32
4.3.6 SORGHUM 34
4.3.7 BEANS 34
4.3.8 TOMATOES 35
4.3.9 RICE 36
4.3.10 SESAME 37

APPENDIX INCOME, EXPENDITURE AND PRODUCTION ACCOUNT TABLES . . . 39

1 INTRODUCTION

This analysis of the profitability of alternative cropping activities is based on a 1600 observation small farmer sample undertaken jointly by the Government of Guatemala and the U.S. Agency for International Development in 1974. Farm level socioeconomic data and detailed crop cost and production data were gathered for crop year 1973. The objective of this report is to highlight profitability differences across 1) crops, 2) technology levels and 3) regions.

Twenty-six crops were included in the analysis. Table 1.1 presents the crops and the number of observations by region for each crop. Sufficient observations were available to allow quite detailed examination of about half of these crops. A number of crops for which few observations were available were also included in the analysis. These crops are included because they present potentially lucrative alternatives to the more frequently observed - yet less profitable - crops such as basic grains. Even though our data are limited in some areas it is important to quantify as well as possible the potential increments to per hectare income which can result from changing crop mix in favor of high value crops.

TABLE 1.1 NUMBERS OF OBSERVATIONS BY CROP BY REGION

Crop	Number of Observations					
		Region				
	All Regions	1	3	4	5	6
Corn	1160	234	65	271	380	210
Beans	308	40		23	97	148
Wheat	238	213				25
Corn & Beans	212	100		3	53	56
Tomatoes	143		4	2	126	11
Rice	127		7	49	50	28
Sesame	105		23	79		3
Sorghum	66			53		13
Corn & Sorghum	58			12	10	36
Potato	51	33			17	1
Corn & Sesame	48		35	12		1
Onion	41	1			20	20
Garlic	19	19				
Pepper	19			1	18	
Oranges	16			10	5	1
Peanuts	16		1	2	13	
Carrots	13	12		1		
Cabbage	11	7			1	3
Peas	6	6				
Flowers	6	1			5	
Horse Beans	5	5				
Cauliflower	5	5				
Apples	4	4				
Peaches*	2		1			1
Avocado	1					1
Strawberries*	1	1				

Note: The numbers for the first thirteen crops above may differ slightly from other tabulations since for these crops all observations were talleyed, while for the purposes of the profitability analysis only observations with non-zero production and crop area were included.

Region 1: Central Highlands
Region 3: South Coast (West)
Region 4: South Coast (East)
Region 5: Northeast
Region 6: Southeast Highlands

* Peaches and strawberries have been excluded from this analysis as the sample observations on these crops were found to be unsatisfactory. The peach trees were too young to be in full production and the strawberry harvest was incomplete at the time that the observation was enumerated.

2 SUMMARY OF CONCLUSIONS

The basic grains and oil seeds were the least profitable of the crops examined with net incomes per hectare generally between Q100 and Q200. The vegetables, especially pepper and cabbage, did somewhat better with profitabilities ranging up to eight times that of the basic grains. Higher profits still were possible with the roots and tubers. Onions and garlic farmers netted over Q1,000 per hectare. The highest profitabilities were found in the tree crops and flowers with net income per hectare ranging from Q700 for oranges to over Q5,000 for apples and flowers. The wide range of crop profitability demonstrates the great importance of crop mix in determining and increasing small farmer incomes in Guatemala. At present prices incomes could be much improved if crop mix were shifted towards the higher value crops. Clearly, the importance of the higher valued crops indicates that 1) potential local and foreign demand for these crops should be investigated, 2) processing and marketing facilities for those types of products should be developed, and 3) given sufficient potential demand and adequate processing and marketing facilities, changes in small farmer crop mix toward higher value crops should be encouraged and the necessary production credit and technical assistance should be provided in these areas.

Within individual crops, particular combinations of modern inputs were found to yield significant improvements in profitability over more traditional techniques which did not make use of modern inputs. The magnitudes of these increases in net income per hectare were not nearly so great as those which could be made by changing crop composition, but there are still significant gains to be made by en-

couraging adoption of modern techniques. For this reason we conclude that 1) production credit programs which make possible purchases of modern inputs should be continued and 2) technical assistance programs to encourage adoption of modern inputs and their proper use should be continued as well.

3 METHODOLOGY

At this point it would seem useful to discuss the methodology used in constructing crop activities and calculating income and expenditure figures and production account coefficients for the various activities.

3.1 DISAGGREGATION OF CROP ACTIVITIES

3.1.1 REGION AND FARM SIZE DISAGGREGATION

Where the number of observations was sufficient, observations were disaggregated according to several criteria. Corn and wheat were disaggregated by farm size (0-1, 1-3, 3-8, 8+ hectares). The thirteen most frequently-observed crops were discriminated by region. These most numerous crops (with respect to the sample) were also disaggregated according to alternative technology levels as discussed in the following section.

3.1.2 ALTERNATIVE TECHNOLOGY LEVELS

One characterization of small farmer agriculture in less developed countries holds that there is such diversity of technology levels present that we can find a significant number of farmers at all stages of a two thousand year technological continuum.[1] Thus some of the most modern techniques may be found in use alongside some of the most primitive. This premise is supported by crop production data from the Guatemala small farmer sample which exhibits high variation in the pattern and level of input use, yields, etc. Some of this variation is no doubt caused by (and thus could be explained by) factors on which we have little or weak data (e.g., land quality differences, climatic variations, etc.). However, the magnitude and pattern of the variation strongly suggest that we are in fact observing alternative technology levels. Certain modern inputs which we believe to be, at most, weakly correlated with soil and climatic conditions do appear to significantly influence yields and profitability. These modern inputs, which include fertilizer, improved seeds and insecticides, are more an indicator of the level of agricultural practice than the land type or weather conditions. Another modern input, machinery use, is more clearly tied to land type than the others, but we feel it is still a clear indicator of the level of technology and agricultural practice.

We intend to use these four modern inputs (fertilizer, improved seeds, insecticides and machinery) to get a feel for the range of agricultural practices of small farmers in Guatemala, and the relative

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[1] Guatemala Farm Policy Analysis p. 13.

profitability of alternative levels of practice. The presence or absence of these inputs and different combinations of the inputs indicate different technological practices. The absence of all improved inputs, the lowest level of technology, we call "basic" since only the basic inputs of land, unimproved seed and human or animal power are employed. It could be argued that animal power is an improvement over human power and constitutes a capital good, and therefore should be included in our consideration of modern inputs. In practice we have found that animal power is a less distinct and less useful indicator of technology level, and in the interest of simplicity we have decided not to consider it a criterion for advanced technology level.

While we are speaking of simplicity we should point out that there are sixteen possible combinations of our four improved inputs. This is certainly too many alternative activities to deal with comfortably.[1] We would hope that sample observations on a particular crop would be fairly heavily concentrated in three or four patterns of input combination. This, unfortunately, is not the case. As we can see from Table 3.1, FREQUENCY OF ALTERNATIVE COMBINATIONS OF INPUTS ON CORN OBSERVATIONS BY REGION, no neat subset of input use combinations tends to fall out, at either the national or the regional level. In Region 1, for example, ten combinations of inputs are observed - half of them with ten or more observations. In the other regions the dispersion among input combinations is even more pervasive.

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[1] Note that adding animal power to our list of criterion inputs would jump us to thirty-two possible technologies.

TABLE 3.1 FREQUENCY OF ALTERNATIVE COMBINATIONS OF INPUTS ON CORN OBSERVATIONS BY REGION

Input Combination	Region 1	3	4	5	6	All Regions
BASIC	49	16	39	124	42	270
FERT	119	1		41	53	214
MACH	2	10	19	23	2	56
TSED	2	1	10	39	6	58
INSD		7	7	4		18
FERT MACH	14	1		17	5	37
FERT TSED	10		7	12	33	62
FERT INSD	27	6	11	27	8	79
MACH TSED		1	6	13	1	21
MACH INSD		5	36	2		43
INSD TSED			6	5		11
FERT TSED MACH	1		6	17	11	35
FERT INSD TSED	2	2	21	10	28	63
FERT INSD MACH	4	8	19	15	2	48
MACH INSD TSED		2	32	9		43
FERT MACH TSED INSD		2	42	16	15	75
ALL COMBINATIONS	230	62	261	374	206	1133

Note: BASIC = No modern inputs
FERT = Fertilizer
MACH = Machinery
TSED = Improved seeds
INSD = Insecticide

Clearly, if we are going to compare technology levels in this fashion, another simplification is in order. We would like to have a smaller number of technology levels and we would like to be able to rank them, a priori, in order of increasing technology level. In order to do this we have gone through a process of looking at the sixteen input combinations of individual crops and reducing the number of possible activities by 1) selecting frequently observed combinations to become possible activities and 2) combining certain input combinations to become possible activities. The result is a somewhat ad hoc, yet straightforward method of generating technological levels which are 1) relatively few in number and 2) can be unambiguously ranked in order of increasing level of technology according to the type and number of modern inputs present.

Table 3.2 presents the technology disaggregation schemes for the thirteen crops for which this was done. Six different schemes are employed with half of them being applicable to more than one crop. So many schemes were used because in the case of the sample data, the patterns of input combinations applicable to one crop were generally not relevant for the other crops. Enough consistency was found within three particular groups of crops that some technology breakdowns were meaningful for several crops within a group, but several other crops had to be considered separately. Many more technologies were delimited for corn and wheat than the other crops because we wished to isolate the effects of machinery use on those two crops. As can be seen from the description of the technologies they are not "all inclusive." Observations which did not fit into any of the technologies were thus excluded from specific analysis, but were, however, included in an

TABLE 3.2 TECHNOLOGY DISAGGREGATION SCHEMES BY CROP

Crop(s)	Technology #	Technology Description
Corn Wheat	1 2 3 4 5 6 7 8 9 10	No modern inputs FERT only FERT and MACH only TECH 2 + TECH 3 FERT and TSED only FERT and TSED and MACH only TECH 5 + TECH 6 FERT and TSED and INSD only FERT and TSED and INSD and MACH TECH 8 + TECH 9
Corn & Beans Corn & Sesame Corn & Sorghum Beans Sorghum	1 2 3 4	No modern inputs FERT only FERT and TSED only FERT and TSED and (MACH or INSD)
Onions Potato Garlic	1 2 3 4 5	No modern inputs FERT only FERT and (either TSED or MACH) only FERT and INSD and (either TSED or MACH) only FERT and INSD and TSED and MACH
Tomato	1 2 3 4	No modern inputs INSD and (only one other modern input) FERT and INSD and TSED only FERT and INSD and TSED and MACH
Rice	1 2 3 4	No modern inputs TSED only TSED and MACH and INSD only TSED and MACH and INSD and FERT
Sesame	1 2 3	No modern inputs TSED only TSED and INSD (at least)

Note: "and" does not mean "and/or";
"or" means "and/or";
"either ... or ... " means one or the other, but not both.

"other" category for purposes of comparisons.

The particular technologies delimited in Table 3.2 are not meant to represent the "most common set of technological practices" or the "best way of looking at alternative technology levels." They were chosen to allow us to get a feel for the variety of technological practices observed among small farmers in Guatemala. The technology levels should increase our understanding of the common patterns of input use by small farmers. Further, the alternative activities are meant to clarify the tradeoffs between operating at alternative levels of technology.

3.2 CALCULATION OF CROPPING ACTIVITY COEFFICIENTS

For each cropping activity calculations were made of income and expenditures, productivity indices and production account coefficients (i.e., yield and input use levels). These variables are described in the following section, DEFINITION OF VARIABLES. All variables were first calculated at the crop level. That is, each plot or field of, say, corn was treated as an observation.[1] Then the observations within each group are used to calculate the coefficients applicable to each group. These group coefficients are actually weighted averages where the weights vary by geographic region (in which the observation is found) according to the inverse of the probability of being sampled.

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[1] Thus, for example, one farm observation could give rise to corn observation, a sesame observation, an apples observation and a garlic observation.

3.2.1 DEFINITION OF VARIABLES

1.	GROSS INCOME	= (Kg. Production * Price per Kg.)/Area
2.	GROSS EXPENDITURES	= (Kg. Seed * Price per Kg. + Kg. Urea * Average Price per Kg. + Kg. Fertilizer * Average Price per Kg. + Cost of Insecticides + Cost of Machinery Use + No. of Animal Days * Average Price per Day + No. Days of Hired Labor * Wages per day)/Area
3.	NET INCOME	= GROSS INCOME - GROSS EXPENDITURES
4.	NET INCOME (FERT)	= Same as NET INCOME Except that Fertilizer Prices were increased 50%
5.	NET INCOME (LBRHRD)	= Same as NET INCOME Except that Total Labor (Family + Hired) is Costed Out at the Hired Wage Rate
6.	NET INCOME (LBROPP)	= Same as NET INCOME Except that Total Labor is Costed Out at one half the Hired Wage Rate (Opportunity Cost)
7.	INCOME PER EXPENDITURES	= GROSS INCOME/GROSS EXPENDITURE
8.	INCOME PER LABOR DAYS	= GROSS INCOME/TOTAL LABOR DAYS
9.	YIELD (1)	= Production of Crop One/Area
10.	YIELD (2)	= Production of Crop Two/Area
11.	TOTAL LABOR DAYS	= Total Days of Labor/Area
12.	FAMILY LABOR	= Days of Family Labor/Area
13.	HIRED LABOR	= Days of Hired Labor/Area
14.	SEEDING RATE (1)	= Kg. of Seed One/Area
15.	SEEDING RATE (2)	= Kg. of Seed Two/Area

16.	VALUE OF FERTILIZERS	= (Kg. of Urea + Kg. Other Fertilizers) * Average Price per Kg./Area
17.	UREA	= Kg. of Urea/Area
18.	OTHER FERTILIZERS	= Kg. of Other Fertilizers/Area
19.	COST OF INSECTICIDES	= Cost of Insecticides/Area
20.	COST OF MACHINERY	= Cost of Machinery/Area
21.	ANIMAL DAYS	= No. of Animal Days/Area
22.	NO. OF OBSERVATIONS (WGHTD)	= Weighted Number of Observations
23.	NO. OF OBSERVATIONS	= Actual Number of Observations

3.2.2 PRICES USED[1] IN CALCULATIONS

The handling of prices in the calculation of the income, expenditure and other variables falls into the areas of crop, seed, labor, animal and fertilizer prices. In general, if a valid price was found in an observation that is the price which was used in the computation. If no valid price was found[2] then a suitable average price was used.

The average crop and seed prices which were used for substitution are presented in Table 3.3 . Labor prices and animal cost per day were varied regionally as shown in Tables 3.4 and 3.5 . The proceedure described in the previous paragraph was varied somewhat with respect to animal cost per day and fertilizer prices. The prices in Table 3.5 were used throughout (instead of questionnaire by questionnaire prices), in the computation of total cost of animal power.[3] There was very little variation in the price of urea and other fertilizers[4] and, hence, the overall average price of .131 per kilogram was used throughout to facilitate comparison of alternate calculation of net income.

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[1] All prices are in terms of 1973 quetzales (1 quetzal = 1 dollar).

[2] Lack of a valid price could be caused by such things as 1) none of the production was sold, 2) seeds were retained from previous years production and, hence, not purchased, 3) no labor was hired, etc.

[3] The reason for this is that the animal cost per day question was subject to high response error and the calculated average should be more accurate.

[4] The standard deviation of the estimated weighted mean fertilizer price by region varied from .00180 to .00648.

TABLE 3.3 AVERAGE CROP AND SEED PRICES BY CROP

Crop	Crop Price	Seed Price
Corn	.112	.215
Beans	.30	.302
Wheat	.167	.179
Rice	.201	.215
Sesame	.279	.418
Sorghum	.114	.180
Onion	.203	1.478
Tomato	.112	1.338
Potato	.102	.162
Garlic	.367	.510

TABLE 3.4 AVERAGE LABOR COST PER DAY BY REGION

Region	Wage
1	.772
3	.931
4	1.23
5	.868
6	.900
All Regions	.914

TABLE 3.5 AVERAGE ANIMAL COST PER DAY BY REGION

Region	Animal Cost Per Day
1	1.62
3	.80
4	2.62
5	2.53
6	2.23
All Regions	2.13

4 PROFITABILITY ANALYSIS

The measure of profitability which we will most frequently use in this analysis is Net Income, variable 3 in Section 3.2.1, DEFINITION OF VARIABLES. The other net income variables defined in Section 3.2.1 and presented in the Income, Expenditure and Production Coefficient Tables in this report[1] can be used to examine relative profitabilities under alternative assumptions. For example, Net Income (Fert) assumes that the price of fertilizer has risen fifty percent while the prices of all other inputs and of the product have remained unchanged. This therefore depicts a situation where the price of fertilizer has risen relative to all other prices. What will interest us is whether the relative profitabilities among crop activities (as indicated by Net Income) will change due to a rise in fertilizer prices (as indicated by Net Income (Fert)). Such a price change could suddenly make one crop more profitable than another, or one particular technique of growing a particular crop more profitable than another. The absolute level of Net Income (Fert) may not be too useful unless the particular type of price change which it assumes has occurred (namely a 50% rise in fertilizer prices and no other changes). However, if most prices have risen somewhat and we think the price of fertilizer has risen relatively more, compared to other prices, then we can get an indication of what changes in relative profitabilities among cropping activities will occur by examining the difference between the patterns of profitabilities of Net Income and Net Income (Fert).

The two remaining net income variables standardize labor costs at the regional level. Net Income (BRHRD) assumes that all labor is

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[1] See Appendix.

paid for at the hired wage rate (without meals). This, for example, could reflect the situation on a large farm where all or practically all labor is hired, or it could indicate the marginal return from expanding a smaller operation if the increased hectarage had to be worked entirely by hired labor. Net Income (LBROPP) assumes that all labor is paid at one half the wage rate. This could indicate profitability if half of labor is hired and half is "free" family labor or it could indicate a situation where all labor is supplied by the family at an opportunity cost of one half the wage rate.

As we indicated above, we will most frequently make use of Net Income for our profitability comparisons. In this calculation labor is costed out as indicated by the observation. This has the advantages of recognizing that a day of labor is probably not a "standard" item; it takes into account quality differences such as difficulty of the work and length of day.

One other general characteristic of these indices of profitability deserves mention here. The net income estimates are based upon sample observations which fell into classes such as 1) corn plots, 2) corn plots in Region 1, 3) corn plots in Region 1 which used fertilizer and improved seed, etc. Into these groups fell observations from farmers who applied inputs in the proper fashion and farmers who applied inputs in improper fashions. The groups include observations from farmers who were good managers, average managers and poor managers. The coefficients are estimated from a sample wherein most people can be expected to have performed in average fashion, some in excellent fashion, and some in poor fashion. The point of this is that our estimates of profitability

potential of various cropping activities are not based upon theoretically achievable agronomic performance, but rather are based upon average levels of actually observed profitability. Our estimates can therefore be expected to be quite replicable when extended to other farmers.[1]

---

[1] Two points with respect to replicability need to be made here. First, we have to be sure that the number of observations of a particular cropping activity is great enough to give us the level of confidence we desire in the estimated coefficients. We won't present confidence intervals for estimated coefficients in this analysis, but we will generally use an estimate with care if it is based upon fewer than twenty actual observations, and we will be somewhat suspicious of an estimate based upon less than ten observations. In some cases where our sample of a particular crop or cropping activity is small we will simply have to use the fairly unreliable estimate. We won't claim that it is precise, but rather that it gives us a general indication of the profitability of a given cropping activity.

The second point we wish to mention is that in the sample data there is a high correlation between the use of modern inputs and technical assistance. Technical assistance is a useful way of effecting adoption of modern inputs, but this can be done in other ways such as information exchange among farmers. The point is that technical assistance probably also affects the profitability performance level of a cropping activity. Thus we probably couldn't expect our profitability estimates for "higher" technology cropping activities to be replicable if these techniques were adopted by a group of farmers without the benefit of any technical assistance.

4.1 PROFITABILITY ACROSS CROPS

For a look at overall profitability among crops let us first examine the differences in net income by crop across regions, (see Table 4.1). Net incomes per hectare range from the low one hundreds for corn, wheat, sorghum, sesame, and peanuts to well over a thousand quetzales for flowers, apples, avocado, onion and garlic. The differences in net income performances among the crops are displayed more clearly in Table 4.2, CROPS BY NET INCOME PER HECTARE. The basic grains[1] did rather poorly. All of these crops fell into the lowest income group except for rice and interplanted corn and sesame which fell into the second from the lowest level.

The two oil seeds, sesame and peanuts, did poorly in terms of profitability. Each yielded little more than Q100 net income per hectare.

The vegetables[2] did a little better, producing net incomes in the four lowest groups of Table 4.2. Peas, habas and cauliflower fell into the two lowest groups while pepper and cabbage appear in one of the two middle income groups, yielding a respectable Q700-Q899 per hectare. It should be noted that the sample sizes for the last two vegetables ranged from eleven to nineteen observations,[3] suggesting

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[1] That is, corn, wheat, sorghum and rice, corn and beans, corn and sesame, corn and sorghum. Even though sesame is an oil seed we will consider interplanted corn and sesame a basic grain for the purposes of this analysis.

[2] That is, tomato, cabbage, pepper, peas, cauliflower and habas (horse beans).

[3] See Table 1.1.

TABLE 4.1 NET INCOME PER HECTARE BY CROP AND BY REGION[1]

	All Regions	Reg 1	Reg 3	Reg 4	Reg 5	Reg 6
Corn	120.7	114.9	88.3	131.8	117.1	130.3
Wheat	116.4	119.5	-	-	-	81.1
Corn & Beans	196.3	151.7	-	162.8**	200.2	227.6
Corn & Sesame	233.9	-	226.2	238.4*	-	351.0**
Corn & Sorghum	177.3	-	-	155.8*	97.5*	188.5
Sorghum	100.7	-	-	96.2	-	108.9*
Beans	168.0	144.7	-	175.9	186.3	168.3
Onions	1551.4	1762.1**	-	-	2413.8	1141.9*
Potatoes	848.4	640.9	-	-	1723.8*	290.3**
Garlic	1484.1*	1484.1*	-	-	-	-
Tomatoes	522.4	-	53.0**	449.6**	572.9	430.6*
Rice	215.2	-	284.0**	227.2	142.8	225.0
Sesame	117.7	-	119.8	127.0	-	-32.3**
Cabbage	825.4*					
Pepper	815.8*					
Peas	119.9**					
Cauliflower	297.0**					
Habas	150.9**					
Carrots	571.6*					
Flowers	5245.8**					
Peanuts	107.4*					
Oranges	749.7*					
Apples	8586.8**					
Avocado	2435.3**					

* Less than 20 observations.
** Less than 10 observations.
\- No observations.

[1] The eleven less frequently observed crops are not presented on a regional basis due to the small sample for these crops.

TABLE 4.2 CROPS BY NET INCOME PER HECTARE

Range of Net Income per Hectare					
100-199	200-299	500-599	700-899	1000-2999	5000-5999
Corn Wheat Corn & Beans Corn & Sorghum Sorghum Beans Sesame Peas Habas Peanuts	Corn & Sesame Rice Cauliflower	Tomatoes Carrots	Pepper Oranges Cabbage Potatoes	Avocado Onions Garlic	Flowers Apples

Source: Table 4.1

that our estimates should be fairly reliable, while for the three vegetables which did fairly poorly (peas, habas and cauliflower) only five or six observations were available for each, suggesting that our estimates are somewhat less reliable for these crops.

The roots and tubers were quite profitable with carrots yielding over Q500 per hectare and onions and garlic yielding over Q1000 per hectare. The sample sizes for those crops were quite good[1] so we can be fairly confident about the income estimates.

The tree crops generated high net incomes per hectare with apples yielding over Q5000, avocado over Q2000, and oranges over Q700. The estimate for oranges is based upon sixteen observations and is fairly reliable. There were four apple observations and only one avocado observation. While our estimates for apples and avocado are of questionable

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[1] See Table 1.1.

reliability there nevertheless appear to be clear indications that in terms of profitability the tree crops 1) are in the upper third of the crops, 2) almost certainly do better than the vegetables and probably do better than the roots and tubers, and 3) will almost certainly yield from three to ten times the net income per hectare than the basic grains.

The remaining crop, flowers, proved to be a most lucrative enterprise also. The average net return was over Q5000 per hectare based upon six observations.

4.2 PROFITABILITY ACROSS REGIONS

Within individual crops looking across regions, no particularly strong trends appear. From Table 4.1 we can see that net income by crop in Region 1 is less than the country average more often than not. In Regions 5 and 6, the crop net income is greater than the national average more often than not. In Regions 3 and 4, there are no particularly distinct patterns. These general indications are supported by the net farm income per cultivated hectare data in Table 4.3 which indicates that farms in Region 1 are doing worse than average and farms in Regions 5 and 6 are doing better than average. The trends in farm profitability resemble the trends in crop profitability even if crop profitability is only a partial determinant of farm profitability.

TABLE 4.3 NET FARM INCOME[1] PER HECTARE CULTIVATED BY REGION

All Regions	Region				
	1	3	4	5	6
137	87	95	132	247	139

[1] This is basically gross farm income less gross farm expenditures. For a detailed discussion of the calculation and imputations involved see Appendix A of "Guatemala Farm Policy Analysis." U.S. AID/LA/DR/SAD. (Washington, D.C.: April, 1975.)

4.3 PROFITABILITY BY CROP

At this stage we can go into a little more detail with out comparative profitability analysis. We will look at each of the ten more frequently observed crops by technology.

4.3.1 CORN

Since corn was the most frequently observed crop in our sample, we can give a fairly detailed analysis of it. Looking at Table 4.4 CORN INCOME AND EXPENDITURE PER HECTARE BY REGION BY TECHNOLOGY, several trends in net income per hectare appear. First, in the All Regions section the high correlation of machinery use with higher profitability is clear. Figure 4.1 illustrates this point by comparing technologies with and without machinery. The technologies with machinery clearly do better than those without. Machinery use can not of course be considered the unique causal factor of increasing profitability, inasmuch as machinery use is dependent upon other things such as land type which are of critical importance in determining profitability. On the basis of our sample information, we are at present unable to predict what the unique impact of machinery on profitability would be on, say, flat land. At this point we can only say that machinery use and higher profitability are closely associated on corn plots.

FIGURE 4.1 CORN NET INCOME PER HECTARE ACROSS REGIONS
MACHINERY vs. NON-MACHINERY TECHNOLOGIES

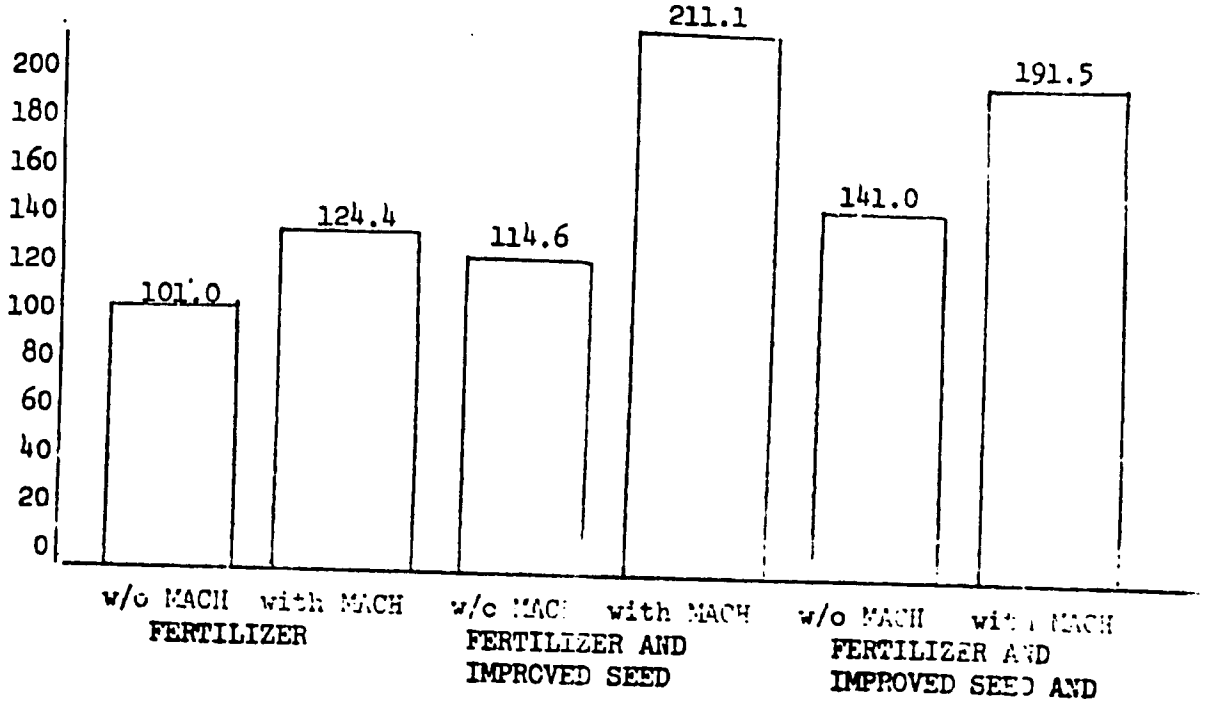

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TABLE 4.4 CORN INCOME AND EXPENDITURE PER HECTARE BY REGION BY TECHNOLOGY

	All Technologies	1 No Modern Inputs	2 FERT Only	3 FERT and MACH Only	4 TECH 2 + TECH 3	5 FERT and TSED Only	6 FERT and TSED and MACH Only	7 TECH 5 + TECH 6	8 FERT and TSED and TSSD Only	9 FERT and TSED and TSSD and MACH	10 TECH 8 + TECH 9	Other
REGION 1												
GROSS INCOME	192.6	145.7	189.8	254.4	196.1	208.0	416.4	229.7	278.3	0.0	278.3	237.5
GROSS EXPENDITURES	77.6	45.1	81.9	130.3	86.6	82.1	125.2	86.6	95.6	0.0	95.6	90.8
NET INCOME	114.9	100.6	107.9	124.1	109.5	125.8	291.2	143.1	182.7	0.0	182.7	146.7
NET INCOME (FERT)	100.5	100.6	89.1	99.9	90.2	107.9	263.4	124.1	159.2	0.0	159.2	131.1
NET INCOME (LEXPRD)	75.0	47.9	68.1	114.6	72.6	96.1	277.7	115.0	163.6	0.0	163.6	108.3
NET INCOME (LEXPRP)	111.9	91.6	103.9	141.9	107.6	130.4	299.8	148.1	190.4	0.0	190.4	144.1
NUMBER OES (LGHTD)	2417.5	557.5	1256.0	134.1	1390.1	137.2	16.0	153.2	32.0	0.0	32.0	284.7
NUMBER OES	234.0	53.0	119.0	14.0	133.0	10.0	1.0	11.0	2.0	0.0	2.0	35.0
AVG NET EXPEND			0.20	0.28	0.21	0.68	2.38	1.02	1.63		1.63	
REGION 3												
GROSS INCOME	156.3	137.9	186.8	172.6	179.7	0.0	0.0	0.0	254.3	210.9	232.6	155.9
GROSS EXPENDITURES	68.0	71.2	153.2	58.2	105.7	0.0	0.0	0.0	154.0	214.4	184.2	53.5
NET INCOME	88.3	66.7	33.6	114.4	74.0	0.0	0.0	0.0	100.2	-3.5	48.4	102.4
NET INCOME (FERT)	85.5	66.7	30.7	112.7	71.7	0.0	0.0	0.0	67.9	-15.7	26.1	100.2
NET INCOME (LEXPRD)	49.2	-0.2	-22.9	111.6	44.3	0.0	0.0	0.0	100.2	-173.9	-45.8	80.7
NET INCOME (LEXPRP)	94.1	66.9	75.2	130.6	102.9	0.0	0.0	0.0	133.4	-2.0	56.7	109.2
NUMBER OES (LGHTD)	676.0	187.2	10.4	10.4	20.8	0.0	0.0	0.0	20.8	20.8	41.6	426.4
NUMBER OES	65.0	18.0	1.0	1.0	2.0	0.0	0.0	0.0	2.0	2.0	4.0	41.0
AVG NET EXPEND			-0.40	-3.67	0.21				0.40	-0.44	-0.16	
REGION 4												
GROSS INCOME	205.0	136.6	0.0	0.0	0.0	143.6	190.4	168.0	225.0	260.9	249.6	209.2
GROSS EXPENDITURES	73.1	29.7	0.0	0.0	0.0	79.1	91.7	85.7	160.4	107.0	104.9	71.7
NET INCOME	131.8	107.2	0.0	0.0	0.0	64.6	98.7	82.3	124.6	153.9	144.7	138.2
NET INCOME (FERT)	127.5	107.2	0.0	0.0	0.0	54.8	80.7	68.3	111.7	144.6	129.3	136.6
NET INCOME (LEXPRD)	104.5	69.6	0.0	0.0	0.0	35.1	38.2	62.7	70.5	135.0	114.7	116.2
NET INCOME (LEXPRP)	137.4	98.9	0.0	0.0	0.0	77.7	108.7	93.8	126.7	169.7	156.1	144.4
NUMBER OES (LGHTD)	1910.0	317.8	0.0	0.0	0.0	44.1	47.8	91.9	139.8	304.7	444.5	1055.2
NUMBER OES	274.0	47.0	0.0	0.0	0.0	7.0	6.0	13.0	21.0	42.0	63.0	147.0
AVG NET EXPEND						-0.86	-0.14	-0.44	0.25	0.60	0.50	
REGION 5												
GROSS INCOME	180.8	143.6	155.3	190.8	186.3	172.6	261.3	229.6	161.3	288.2	248.4	159.2
GROSS EXPENDITURES	63.7	35.8	40.8	35.2	40.0	84.2	95.9	92.2	93.0	127.7	116.8	63.6
NET INCOME	117.1	107.8	94.5	155.6	112.3	88.4	165.5	137.4	68.3	160.5	131.6	120.6
NET INCOME (FERT)	111.4	107.8	2.6	142.6	100.2	80.6	149.3	120.9	59.1	140.6	115.0	96.0
NET INCOME (LEXPRD)	101.6	86.3	77.9	145.7	94.9	93.6	155.1	139.7	60.2	156.2	126.1	109.0
NET INCOME (LEXPRP)	127.4	110.5	95.4	166.6	116.2	120.9	176.9	153.7	91.0	177.5	150.7	133.0
NUMBER OES (LGHTD)	1534.3	470.2	159.6	66.4	226.0	43.3	61.2	104.5	78.2	79.4	115.6	615.0
NUMBER OES	176.0	124.0	42.0	17.0	59.0	12.0	17.0	29.0	10.0	17.0	27.0	137.0
AVG NET EXPEND			-0.53	0.96	0.14	-0.40	0.90	0.44	-0.69	0.57	0.29	
REGION 6												
GROSS INCOME	193.1	127.6	140.5	154.1	142.2	190.0	370.2	232.2	247.3	399.4	313.7	[illegible]
GROSS EXPENDITURES	62.8	28.3	53.0	54.9	53.3	71.2	107.5	79.0	54.4	93.4	83.3	50.9
NET INCOME	130.3	99.3	87.5	99.1	89.0	118.7	262.6	152.5	192.9	306.0	233.4	71.2
NET INCOME (FERT)	130.5	99.3	79.0	90.2	80.4	104.7	244.1	137.4	177.2	290.5	209.6	66.3
NET INCOME (LEXPRD)	109.2	65.1	62.8	94.4	66.8	87.2	268.4	137.4	211.4	297.0	209.3	51.4
NET INCOME (LEXPRP)	133.3	91.1	68.6	103.1	91.1	121.3	286.7	160.1	219.5	313.4	272.3	76.3
NUMBER OES (LGHTD)	2067.1	363.1	519.5	76.4	595.9	443.1	176.1	579.2	202.0	156.9	282.9	190.0
NUMBER OES	210.0	46.0	52.0	[illegible]	58.0	33.0	[illegible]	44.0	20.0	15.0	47.0	19.0
AVG NET EXPEND			-0.48	-0.01	-0.41	0.45	2.06	1.03	1.13	3.18	2.10	
ALL REGIONS												
GROSS INCOME	190.5	139.5	173.8	221.6	196.0	189.5	314.6	264.6	225.5	301.6	272.1	193.1
GROSS EXPENDITURES	69.1	33.6	72.6	95.2	76.0	79.6	103.4	82.9	94.5	110.1	102.3	69.1
NET INCOME	120.7	99.9	101.0	121.4	104.0	114.6	211.1	141.7	141.0	191.5	169.5	124.0
NET INCOME (FERT)	112.1	99.9	85.6	102.7	88.4	100.5	193.1	126.5	125.4	179.8	155.6	119.6
NET INCOME (LEXPRD)	92.9	59.6	67.7	116.6	77.0	92.[illegible]	209.4	95.4	111.2	171.8	145.1	102.9
NET INCOME (LEXPRP)	123.9	95.0	84.0	138.2	104.0	120.3	229.2	0.0	148.6	204.6	179.1	131.0
NUMBER OES (LGHTD)	8645.1	1815.1	1945.5	387.3	2332.8	687.7	261.1	928.8	430.8	561.8	992.6	5574.9
NUMBER OES	1155.0	288.0	215.0	37.0	252.0	62.0	35.0	97.0	63.0	76.0	33.0	379.0
AVG NET EXPEND			0.03	0.42	0.11	0.42	1.94	0.97	0.35	1.30	1.09	

Looking at the non-machinery activity profitabilities in Figure 4.1 there is a gradual increase in profitability as we first include the use of improved seed with fertilizer and then include insecticide use with fertilizer and improved seed use. A general indicator of the financial return of the modern input technologies over the "basic" technology can be found in Table 4.4. The variable "Marg Ret Expend" is the marginal return to net income with respect to marginal changes in expenditures. The numbers of interest are in the modern input technology columns and are formed according to the following formula:

$$\frac{\left[\text{NET INCOME PER HECTARE MODERN INPUT TECHNOLOGY}\right] - \left[\text{NET INCOME PER HECTARE BASIC TECHNOLOGY}\right]}{\left[\text{GROSS EXPENDITURE PER HECTARE MODERN INPUT TECHNOLOGY}\right] - \left[\text{GROSS EXPENDITURE PER HECTARE BASIC TECHNOLOGY}\right]}$$

These figures can give us an indication of the feasibility of loaning money to farmers to finance modern input purchases. If we assume that a given farmer can afford to spend as much on inputs as is required by the technology - then his credit requirements to pursue an advanced technology are precisely the difference in gross expenditures between the basic and advanced technology.

Across regions the marginal return to expenditure of the improved input technologies vary from .03 to 1.74. This means that per quetzal of additional expenditure over basic technology practices net income

can be increased between Q.03 and Q1.74. The nonmachinery technology coefficients are of particular interest since they represent improved techniques which can be adopted with fewer hindrances than with machinery techniques. These coefficients are .03 for fertilizer only, .42 for fertilizer and improved seed, and .75 for fertilizer, improved seed and insecticide. This indicates that the return to using only fertilizer (in terms of improved inputs) is almost negligable compared to that of using fertilizer and improved seed or both improved seed and insecticide. The return on the fertilizer only technology is certainly inadequate to allow more than a tiny return after payment of interest charges on borrowing to finance improved input purchases. With respect to the technologies which include improved seeds and insecticides, the situation is more encouraging. The returns to these activities would certainly allow repayment of loan principle and interest charges plus a significant improvement in net income. We must point out that the advanced technologies differ from the basic technology by more than increased expenditures. In particular the use of modern inputs is highly correlated with technical assistance and part of the increase in net income is no doubt a return to technical assistance activity rather than being entirely a return to working capital expenditure.

We can examine the effects of farm size on profitability in Table 4.5, CORN NET INCOME PER HECTARE CULTIVATED ACROSS TECHNOLOGIES BY REGION BY FARM SIZE. In the All Region row there is little variation

in net income per hectare across farm size.[1] In general, it does not appear that any particular size group of farmers are strikingly more efficient cultivators of corn, but the 0-1 and 8+ hectare groups do somewhat better than average on the national level.

It is worthy of note that in the poorest region, Region 1, the smallest farms are much more profitable corn producers than other size farms. In the southern coastal areas (Regions 3 and 4) there is a tendancy for larger farms to be more efficient. In Region 5, the Northeast, larger farms appear to be less efficient than average while in Region 6, the Southeast Highlands they appear to be more efficient.

TABLE 4.5 CORN NET INCOME PER HECTARE CULTIVATED ACROSS TECHNOLOGIES BY REGION BY FARM SIZE

	Area in Farm				
	0 - 1	1 - 3	3 - 8	8+	All Sizes
All Regions	124.3	117.4	121.1	125.2	120.7
Region 1	129.5	97.1	79.8**	36.7**	114.9
Region 3	102.8**	30.6*	122.6	90.4*	88.3
Region 4	130.9	131.0	124.	153.3	131.8
Region 5	120.6	122.6	108.1	68.	117.1
Region 6	113.7	132.4	151.6	151.7**	130.3

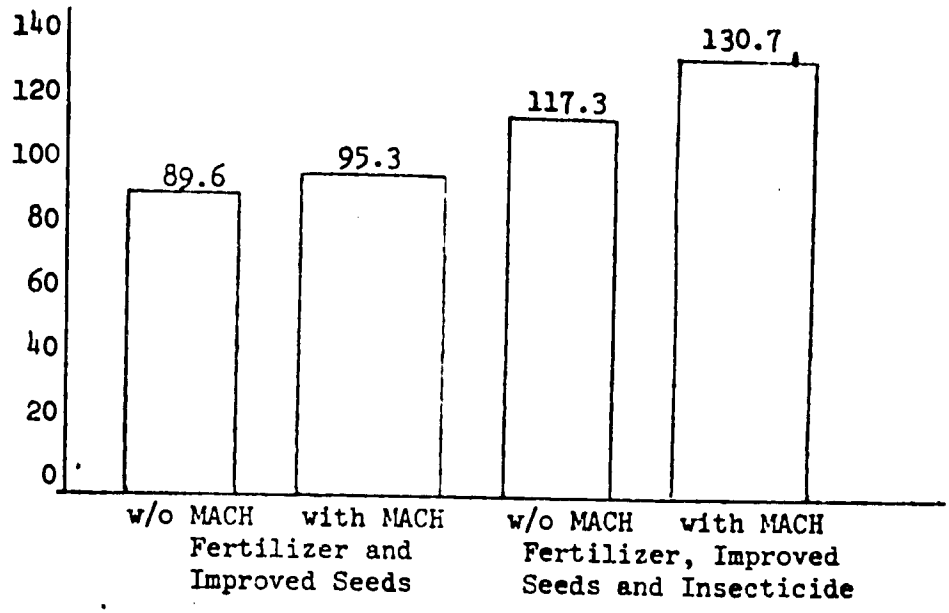
* Less than 20 observations.
** Less than 10 observations.

[1] Note that Net Income per Hectare is computed using the size of the corn field in each observation rather than farm size. Thus a farm of ten hectares could be found cultivating a corn plot of, say, one tenth hectare.

4.3.2 WHEAT

Wheat income and expenditure data by technology and region are presented in Table 4.6. Clearly, improved inputs played a great role in the production of wheat.[1] There were few observations using basic technology or the three modern input technologies involving fertilizer or fertilizer and machinery. In the remaining modern input technologies it is not until at least fertilizer, improved seeds and insecticide are used in combination that profitability becomes above average. The machinery technologies were more profitable than the non-machinery technologies,[2] but the trends were not so distinct as with corn (see Figure 4.2). The differences in profitability per hectare between comparable

FIGURE 4.2 BEANS NET INCOME PER HECTARE ACROSS REGIONS
MACHINERY vs. NON-MACHINERY TECHNOLOGIES



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[1] In fact over ninety-five percent of the wheat observations reported use of improved seeds.

[2] Except for the fertilizer and fertilizer machinery technologies where lack of observations makes the comparison very unreliable.

TABLE 4.6 WHEAT INCOME AND EXPENDITURE PER HECTARE BY REGION BY TECHNOLOGY*

	All Technologies	1 No Modern Inputs	2 FERT Only	3 FERT and MACH Only	4 TECH 2 + TECH 3	5 FERT and TSED Only	6 FERT and TSED and MACH Only	7 TECH 5 + TECH 6	8 FERT and TSED and INSD Only	9 FERT and TSED and INSD and MACH	10 TECH 8 + TECH 9	Other
Region 1												
Gross Income	244.2	211.9	252.1	147.2	223.2	212.6	235.9	220.4	244.2	262.9	255.2	242.6
Gross Expenditures	124.7	116.5	97.3	93.3	96.2	119.6	135.7	125.0	125.0	131.9	129.0	102.9
Net Income	119.5	95.4	154.8	53.9	127.0	93.1	100.2	95.2	119.2	131.1	126.2	139.7
Number of Obs. (Wghtd.)	2232.1	12[illegible]2	42.0	16.0	58.0	373.8	188.0	561.8	573.6	820.8	1394.4	205.7
Number of Obs.	211.0	2.0	5.0	1.0	6.0	50.0	19.0	69.0	54.0	55.0	109.0	25.0
Region [illegible]												
Gross Income	187.9	69.9	-	-	-	173.4	164.9	171.6	224.9	201.2	222.6	-
Gross Expenditures	106.8	33.2	-	-	-	99.0	108.3	101.0	123.3	113.0	122.3	-
Net Income	81.1	36.8	-	-	-	74.4	56.6	70.6	101.6	88.2	100.3	-
Number of Obs. (Wghtd.)	197.5	7.9	-	-	-	86.9	23.7	110.6	71.1	7.9	79.0	-
Number of Obs.	25.0	1.0	-	-	-	11.0	3.0	14.0	9.0	1.0	10.0	-
All Regions												
Gross Income	239.6	156.[illegible]	252.1	147.2	223.2	205.2	228.0	212.4	242.1	262.3	253.5	242.6
Gross Expenditures	123.2	83.[illegible]	97.3	93.3	96.2	115.7	132.6	121.1	124.8	131.7	128.6	102.9
Net Income	116.4	72.[illegible]	154.8	53.9	127.0	89.6	95.3	91.3	117.3	130.7	124.8	139.7
Number of Obs. (Wghtd.)	2429.6	20[illegible]	42.0	16.0	58.0	460.7	211.7	672.4	644.7	828.7	1473.4	205.7
Number of Obs.	236.0	3[illegible]	5.0	1.0	6.0	61.0	22.0	83.0	63.0	56.0	119.0	25.0

* The marginal return to expenditure variable is not presented here because it would be highly unreliable given the small sample size of the basic technology group.

machinery and non-machinery technologies ranged from Q23.4 to Q96.5 for corn as compared with from Q5.7 to Q13.4 for wheat. This is not an unusual result when we note that wheat is primarily a small farmer crop. From Table 4.7, PERCENT OF WHEAT AND CORN CROPS BY FARM SIZE, we note that forty-two percent of wheat farmers have a farm of less than one hectare and eighty-eight percent have a farm of less than three hectares. Of corn farmers only twenty-eight percent have a farm of less than one hectare. This indicates that there is more potential for realizing the advantages of machinery on corn farms rather than wheat farms.

TABLE 4.7 PERCENT OF WHEAT AND CORN CROPS BY FARM SIZE

	Farm Size			
	0 - 1	1 - 3	3 - 8	8+
Wheat	.42	.46	.11	.01
Corn	.28	.45	.19	.08

With respect to wheat, there appears to be a negative relationship between profitability and farm size. As indicated in Table 4.8, net income per hectare drops steadily as farm size rises. This could be an indication that the more profitable techniques of producing wheat in Guatemala are fairly labor intensive and that only on a small farm is enough inexpensive labor available to exploit these labor intensive activities.

TABLE 4.8 WHEAT NET INCOME PER HECTARE CULTIVATED ACROSS TECHNOLOGIES BY REGION BY FARM SIZE

	Area in Farm				
	0 - 1	1 - 3	3 - 8	8+	All Sizes
All Regions	133.6	114.2	74.7	-43.2**	116.4
Region 1	135.1	117.3	79.9*	-43.2**	119.5
Region 6	68.0**	93.1*	37.0*	-	81.1

* Less than 20 observations.
** Less than 10 observations.
\- No observations.

4.3.3 CORN AND BEANS

Income and expenditure data by technology for corn and beans (as well as corn and sesame, corn and sorghum, sorghum, and beans) is presented in Table 4.9. The fertilizer only technology seems to offer a significant improvement over the basic technology with a marginal return to expenditure coefficient of 0.38. In the two remaining modern input technologies the profitability increases significantly over the basic and fertilizer technologies, but due to small sample sizes the coefficients for these advanced technologies are too unreliable to allow us to conclude more at this point.

4.3.4 CORN AND SESAME

There were too few observations which fell into our technology groupings to say much about advanced technologies for corn and sesame (see Table 4.9). The most advanced technology did substantially better than the basic technology, but this conclusion can be only tentative without more sample data on interplanted corn and sesame.

4.3.5 CORN AND SORGHUM

With interplanted corn and sorghum, we find enough observations to allow some tentative conclusions on technology level (see Table 4.9). Profitability increased steadily as we move from basic up through the more advanced technologies. The marginal returns to expenditure were also high enough (between 0.81 and 1.24) to indicate that financing the purchases of modern inputs through credit would be a worthwhile proposition. The fertilizer only technology was a substantial improve-

TABLE 4.9 PER HECTARE INCOME AND EXPENDITURE DATA BY TECHNOLOGY AT THE NATIONAL LEVEL FOR CORN AND BEANS, CORN AND SESAME, CORN AND SORGHUM, SORGHUM AND BEANS

	All Technologies	No Modern Inputs	Fertilizer Only	Fertilizer and Improved Seed Only	Fertilizer and Improved Seed and either Machinery or Insecticide	Other
Corn and Beans						
Gross Income	285.6	176.9	263.4	923.0**	489.23**	313.7
Gross Expenditures	89.3	46.8	96.2	265.2	143.33	89.6
Net Income	196.3	130.2	167.1	657.8	345.9	224.0
Marg. Ret. Exp.			0.38	1.98	1.5	
Corn and Sesame						
Gross Income	284.6	273.1**	-	-	371.6**	270.2
Gross Expenditures	50.8	36.8	-	-	89.8	54.8
Net Income	233.9	236.2	-	-	286.2	215.4
Marg. Ret. Exp.			-	-	0.94	
Corn and Sorghum						
Gross Income	245.3	149.0*	249.6*	258.3**	295.8**	186.3**
Gross Expenditures	67.9	29.2	71.5	61.8	84.0	85.4
Net Income	177.3	119.8	178.1	196.5	211.8	100.9
Marg. Ret. Exp,			0.81	1.24	1.09	
Sorghum						
Gross Income	149.3	166.1	-	471.1*	168.7**	97.6
Gross Expenditures	48.6	35.6	-	58.4	100.14	53.8
Net Income	100.8	130.0	-	412.7		43.0
Marg. Ret. Exp.			-	4.83	0.41	
Beans						
Gross Income	246.3	220.8	201.4	226.5*	304.0	298.1
Gross Expenditures	78.3	62.0	82.4	76.2	89.8	98.8
Net Income	168.0	168.7	119.1	150.4	214.3	199.3
Mar. Ret. Exp.			-0.60	-0.24	0.51	

* Less than 20 observations.
** Less than 10 observations.
\- No observations.

ment over the basic technology. The remaining advanced technologies, fertilizer and improved seed and this combination plus one other modern input, seem to offer a modest improvement in profitability over fertilizer only, but this is indicated only tentatively by the data.

4.3.6 SORGHUM

There are too few observations on sorghum to allow strong conclusions about technology levels (see Table 4.9). One advanced technology did better than basic and one did worse, but there were only two or three observations on these advanced technologies. It is interesting to note that profitability for the no modern inputs, or basic, technology was quite a bit higher than the overall average - Q130.6 as compared to Q100.8 overall - suggesting that for sorghum the basic technology is not a bad choice of technique.

4.3.7 BEANS

For beans there are some interesting results of the technology breakdown. Both fertilizer only and fertilizer and improved seeds technologies did poorer than the basic technology. The most advanced technology, fertilizer, improved seeds and one other modern input, did somewhat better than basic, but not significantly so. This suggests that financing improved inputs for bean production is a project of dubious value. (See Table 4.9.)

4.3.8 TOMATOES

Income and expenditure data by technology for tometoes are presented in Table 4.10. It is clear that the modern inputs play a significant role in the cultivation of tomatoes because 85 percent of the tomato crops sampled were found to use either the fertilizer, insecticide and improved seed technology or the all modern inputs technology. These two modern input technologies also had net incomes greater than the overall average. In this particular case the marginal return to expenditure coefficients are unreliable,[1] but it is apparent that modern inputs are a clear necessity for tomato production. Given the fact that tomatoes are a reasonably profitable crop (two to five times as profitable as the basic grain crops) the financing of tomato production would seem to be a worthwhile proposition. Inasmuch as expenditures for tomato production are much higher than expenditures for basic grain production, the need for working capital is more critical and hence the importance of production credit is greater.

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[1] This is precisely because so few farmers used modern inputs.

TABLE 4.10 PER HECTARE INCOME AND EXPENDITURE DATA BY TECHNOLOGY AT THE NATIONAL LEVEL FOR TOMATOES

	All Technologies	No Modern Inputs	INSD and (One Other Modern Input)	FERT and INSD and TSED	All Modern Inputs	Other
Gross Income	739.3	132.4**	331.0**	831.0	740.5	748.6*
Gross Expenditure	216.9	51.4	80.6	267.1	212.8	172.6
Net Income	522.4	81.0	250.5	564.0	527.6	575.9
Marg. Ret. Exp.			5.80†	2.24†	2.77†	

* Less than 20 observations.
** Less than 10 observations.
† Unreliable due to small sample size for no modern inputs technology.

4.3.9 RICE

Table 4.11 presents income and expenditure data for rice. All modern inputs except fertilizer appear to have been important for rice profitability. As with tomatoes, few farmers used no modern inputs. Improved seed alone yielded substantial increase in profitability. The marginal return to expenditure coefficients ranged from 0.62 to 0.08 suggesting that financing purchases of modern inputs (mainly improved seeds) would be worthwhile for rice.

TABLE 4.11 PER HECTARE INCOME AND EXPENDITURE DATA BY TECHNOLOGY AT THE NATIONAL LEVEL FOR RICE

	All Technologies	No Modern Inputs	TSED Only	TSED, MACH and INSD	All Modern Inputs	Other
Gross Income	322.1	228.6*	390.1	339.0*	333.0	311.4
Gross Expenditure	106.9	37.2	137.1	121.4	134.1	95.8
Net Income	215.2	191.5	253.0	217.6	199.0	215.6
Marg. Ret. Exp.			0.62	0.31	0.08	

* Less than 10 observations.

4.3.10 SESAME

Income and expenditure data for sesame is presented in Table 4.12. Modern inputs again play an important role. The technology with at least improved seed and insecticide was the most profitable with a net income per hectare of Q185.3. It is interesting to note that neither the no modern inputs nor the improved seeds only technologies did well with respect to profitability. [illegible] were [illegible] ment over no modern inputs but the increase in net income was much more dramatic when at least improved seeds and insecticides were used. With marginal return to expenditure coefficients of 2.33 and 5.84, a high return to modern inputs is indicated. However, the gross expenditures per hectare for the advanced technologies are little more than for the basic technology. This leads us to believe that for sesame, as for most other crops, some other factors such as technical assistance are affecting profitability.

TABLE 4.12 PER HECTARE INCOME AND EXPENDITURE DATA BY TECHNOLOGY AT THE NATIONAL LEVEL FOR SESAME

	All Technologies	No Modern Inputs	TSED Only	At Least TSED and INSD	Other
Gross Income	181.4	132.2*	138.6	260.3	164.6
Gross Expenditure	63.8	56.1	57.9	74.8	63.5
Net Income	117.7	76.1	80.3	185.3	101.0
Marg. Ret. Exp.			2.33	5.84	

* Less than 10 observations.

APPENDIX

INCOME EXPENDITURE AND PRODUCTION ACCOUNT COEFFICIENT TABLES

Note: Tables for pepper, oranges, peanuts, carrots, cabbage, peas, flowers, horse beans, cauliflower, apples, and avocado, follow immediately. The tables for corn, beans, wheat, corn and beans, tomatoes, rice, sesame, sorghum, corn and sorghum, potato, corn and sesame, onion, and garlic, are in the form of computer print-outs not included with all copies of this report.

TABLE A1 INCOME EXPENDITURE AND PRODUCTION COEFFICIENTS BY CROP

Per Hectare Variables	Cabbage	Pepper	Peas	Cauliflower
GROSS INCOME	1026.66	1107.06	174.30	410.80
GROSS EXPENDITURES	201.23	284.91	52.53	113.90
NET INCOME	825.43	815.81	119.87	296.95
NET INCOME (FERT)	760.93	805.16	117.27	280.36
NET INCOME (LBRHRD)	774.44	748.10	41.87	97.18
NET INCOME (LBROPP)	818.18	525.23	93.98	199.88
INCOME PER EXPENDITURES	3.59	4.22	1.41	1.61
INCOME PER LABOR DAYS	6.09	4.56	1.70	2.16
YIELD (1) 1.64 65,776	29898.85	7252.85	1581.10	6617.44
YIELD (2)				
TOTAL LABOR DAYS	183.68	146.44	143.90	266.62
FAMILY LABOR	98.82	22.10	104.60	225.14
HIRED LABOR	84.79	125.28	39.30	41.62
SEEDING RATE (1)	1085.15	765.81	50.80	7.37
SEEDING RATE (2)				
VALUE OF FERTILIZERS	86.70	62.20	10.70	75.65
UREA	32.70	26.99		
OTHER FERTILIZERS	648.10	397.42	69.60	575.90
COST OF INSECTICIDES	18.60	88.69		.75
COST OF MACHINERY		16.83		
ANIMAL DAYS		2.65		
NO. OF OBSERVATIONS (WGHTT'	104.90	120.43	73.32	51.65
NO. OF OBSERVATIONS	11.00	19.00	6.00	5.00

TABLE A1 INCOME EXPENDITURE AND PRODUCTION COEFFICIENTS BY CROP

Per Hectare Variables	Habas	Carrots	Flowers*	Peanuts
GROSS INCOME	276.78	736.45	6259.15	176.15
GROSS EXPENDITURES	125.90	164.80	1013.34	68.75
NET INCOME	150.87	571.64	5245.81	107.39
NET INCOME (FERT)	136.47	550.88	5053.46	102.28
NET INCOME (LBRHRD)	130.36	498.30	5076.31	68.73
NET INCOME (LBROPP)	182.53	571.04	5306.04	116.81
INCOME PER EXPENDITURES	2.02	2.94	6.17	2.35
INCOME PER LABOR DAYS	2.03	3.89	12.02	2.58
YIELD (1)	1606.11	10826.59	28377.22	797.67
YIELD (2)				
TOTAL LABOR DAYS	135.18	184.91	543.24	88.60
FAMILY LABOR	24.81	88.24	238.84	30.81
HIRED LABOR	46.76	96.67	304.39	57.54
SEEDING RATE (1)	192.05	2435.67	75396.66	51.22
SEEDING RATE (2)				
VALUE OF FERTILIZERS	15.99	45.56	298.85	3.45
UREA	7.79	10.32		
OTHER FERTILIZERS	213.69	298.62	1842.64	28.23
COST OF INSECTICIDES	2.25	12.73	44.50	
COST OF MACHINERY				
ANIMAL DAYS	5.88	.997		4.31
NO. OF OBSERVATIONS (WGHTD)	50.30	145.97	48.18	75.32
NO. OF OBSERVATIONS	5.00	13.00	6.00	16.00

*Seeding rate refers to number of plants per hectare.

TABLE A1 INCOME EXPENDITURE AND PRODUCTION COEFFICIENTS BY CROP

Per Hectare Variables	Oranges *	Apples *	Avocado*
GROSS INCOME	936.32	8775.70	2528.73
GROSS EXPENDITURES	186.59	188.86	93.45
NET INCOME	749.71	8586.83	2435.28
NET INCOME (FERT)	749.71	8584.42	2435.28
NET INCOME (LBRHRD)	711.13	8454.46	2407.23
NET INCOME (LBROPP)	804.40	8610.79	2467.98
INCOME PER EXPENDITURES	5.01	37.34	21.33
INCOME PER LABOR DAYS	4.73	35.97	30.67
YIELD (1)	8710.33	2344.85	3057.02
YIELD (2)			
TOTAL LABOR DAYS	187.07	406.04	135.21
FAMILY LABOR	37.98	175.79	36.61
HIRED LABOR	155.17	230.20	98.59
SEEDING RATE (1)	234.85	69.80	133.71
SEEDING RATE (2)			
VALUE OF FERTILIZERS	.70	4.00	
UREA	4.40		
OTHER FERTILIZERS		37.00	
COST OF INSECTICIDES	9.74	4.4	
COST OF MACHINERY	.82		
ANIMAL DAYS			
NO. OF OBSERVATIONS (WGHTD)	72.79	29.02	9.21
NO. OF OBSERVATIONS	16.00	4.00	2.00

*Seeding rate refers to number of trees per hectare.

A PROPOSED PLAN FOR SHORT AND LONG-TERM PRE- AND IN-SERVICE TRAINING FOR GUATEMALA AGRICULTURAL PUBLIC SECTOR PERSONNEL - 1976-1980 1/

INTRODUCTION

The Agricultural Public Sector in Guatemala is composed of those institutions having direct governmental responsibility for providing technical, research, financial and marketing services to the rural agricultural family. It is composed of the National Agricultural Development Bank (BANDESA), the General Directorate of Agricultural Services (DIGESA), the Agricultural Technical Sciences Institute (ICTA), the National Forestry Institute (INAFOR), the National Institute of Agricultural Marketing (INDECA), the National Institute of Agrarian Reform (INTA), other institutions, the Agricultural Planning Unit of the Sector and other administrative support staff.

During the first five years of the National Development Plan, efforts were made to provide for the training of the Agricultural Sector personnel. The results of those attempts failed to generate continuous and permanent support for the Institutions. This pre and in-service training proposal attempts to review the results of previous efforts and report training needs in Sector Institutions.

The six major Sector Institutions have a total of 3,128 employees in the categories 1 through 8 as shown in TABLE I. Personnel in categories 9 and 10, which includes skilled and unskilled workers, is an estimate and therefore incomplete. Approximately 750 employees in Sector Institutions, or approximately 25%, have direct contact with the rural family.

1/ Summary of a report prepared by W.P.Schroeder of Cal Poly University and John Guy Smith of BASICO Inc. with collaboration of the National Planning Council in September 1975.

TABLES I and II reveal the number, classification and academic preparation of employees for each Institution. TABLE III indicates the geographic level of responsibility for employees for each Institution.

Training efforts have been spotty and sporadic at the majority of Sector Institutions. Only DIGESA and ICTA have managed to sustain ongoing training programs due to a department or persons in charge of that activity. Recent regionalization of services by the Sector Institutions, in compliance with the National Development Plan, has created a climate where adjustments and reorganization have been a major priority. Even though Sector personnel are cognizant of the need for training, their immediate concerns have been elsewhere.

Although raising the living level of the rural poor through increased crop production is a critical need in Guatemala, only a minority of rural families receive the direct services from field personnel of the nation's Agricultural Public Sector. Often the youngest, most inexperienced persons are assigned to farm contact work and many move to new positions in less than two years after appointment. In addition to crucial farmer training, increased training is needed for farm women who occupy critical roles in agricultural production and family care.

The mission of the Agricultural Public Sector is so important to Guatemala and the number of people in the Sector so large that a full-scale and comprehensive pre- and in-service training program is justified.

Pre-service training is orientation given new employees of the Institutions of the Sector to motivate and give knowledge of their new assignment to assure great effectiveness in the services they are to perform.

In-service training is the development of attitudes, knowledge, abilities, and skills needed by the Sector personnel through the use of such means as courses, short courses, seminars, workshops, individual instruction, independent study, field study, all types of media and human resource persons including farmers.

RESOURCES AVAILABLE FOR TRAINING

From 1970-74, sectoral training responsibility has been charged to the Training Division in DIGESA. Attempts to implement training at the Sector level by a division

within one of the Institutions encountered many barriers, including lack of horizontal mobility. DIGESA has benefited most, due to the placement of the training entity within their organization.

In retrospect, each institution has opted for solving its own training problems most of the time. BANDESA, INAFOR, INDECA, and INTA utilize people within their ranks as trainers. ICTA presently sends its technicians to CIAT in Colombia and to CIMMYT in Mexico for training. DIGESA's training needs have been the closest to being met.

In summary, the present structure has complicated the training tasks of DIGESA. The lack of coordination at the Sector level in the training area has resulted in each Institution solving its immediate needs or ignoring them depending on the priorities existing at the time.

It is recommended that a more detailed study of available human training resource qualifications be completed at each Institution during the early phases of the training program.

The seven facilities best suited for servicing a training program consist of the centrally located center at Amatitlán that has accomodations for 60 people and the six regional training centers strategically located throughout the country that will accomodate 80 trainees each at any given period of time. Facilities available in the Capital City are limited to conference rooms in sector institutions and classrooms at the Barcena school when it is not in session.

Some of the institutions have limited training equipment such as film and slide projectors but these are limited. A complete inventory should be made and training equipment and materials procured as required to mount a meaningful training activity.

An inventory of physical resources equipment and training aids available for training purposes was requested from each Institution.

TRAINING NEEDS

A sampling of training needs was conducted in each Sector Institution. A total of 107 persons responded to

the questionnaire. The persons responding in greatest frequency were administrator-executives and supervisors. Their opinions reflected ratings of their training needs as well as the needs of other classes of workers with which they were fairly well acquainted. The tabulation of responses is shown in APPENDIX A.

1. Administrators and supervisors strongly recommend pre and in-service training for employees.

2. Greatest training needs in classifications 1 through 8 according to every respondent were in the area of individual capability which included the factors of human relations, oral and written communications and work organization.

3. In general, there was a need shown for orientation about the Sector and knowledge about agriculture in the nation.

4. A reasonably strong need was revealed for management and middle-management training.

5. Moderate need was in evidence for training in technical knowledge.

RECOMMENDATIONS

1. Need for a broad range of pre and in-service training for Sector employees.

2. Critical needs exist at the farm family contact level for pre and in-service training.

3. Detailed needs analysis and the prescription of training needs for the several classifications of employees.

4. Need exists for limited advanced academic training in Master's and PhD degree work.

5. Moderate need was shown for training in extension, promotion, research, education and secretarial technical functions.

In order to carry out a comprehensive training program it was felt that the following needed to be accomplished:

1. Assess the needs and capabilities of the personnel and the potential physical facilities of the Sector, assess previous and present Sector training efforts, conduct a detailed training needs assessment, and conduct a detailed survey of human and physical resources available for training services.

2. Incorporate training as an integral function of each institution in the Sector. Also examine the Institution's goals and objectives for training, designate appropriate personnel to coordinate and carry out training through each Institution, and develop means for motivating personnel to be interested in training activities.

   Also, one should provide a plan for appropriate and continuous training for all Sector personnel which included establishment of priorities for training based on the detailed analysis made above, develop a training plan with emphasis on the following:

   a. personnel having direct contact with farm families.

   b. on-the-job training for rural contact personnel.

   c. several avenues of communication to rural contact personnel.

   d. self-improvement.

   e. training of the trainers.

   f. evaluation systems.

   Finally, provide coordination in planning and logistic support for training activities through the Agricultural Sector Planning Unit.

TRAINING PRIORITY - Recommendations

A. Pre-Service Training Needs

Survey results indicate a need for orientation of all new employees.

Recommendations:

Provide general orientation for all new employees during their first year of service. This training should provide the employee with a comprehensive orientation to the Sector, the Institution and the sub-program to which he is assigned.

B. In-Service Training Needs

The first and most critical priority is training the trainers and is based on the assumption that on-the-job training will be the principal training system employed to reach the 80% of employees who function below the level of supervisor.

RECOMMENDATIONS:

1. In recognizing this critical role, the first priority for training must be training supervisors as trainers. Such training should be initiated for all supervisors during the first year of the project.

2. Based on consultation with their executives it is suggested that on a priority basis one-third of the executive-administrators participate in management training each year starting during the first year of the training program.

3. One half the supervisors should be given middle management training during the first year of the project and the remainder the second year.

4. Research technicians come to their positions with considerable technical competence. These technicians have an important role as trainers. They should be provided training in how to organize and present short courses and field days, human relations, oral and written communications and work-organization.

5. Service technicians come to their jobs with a wide background of experience. They should be given in-service training in human relations, oral and written communication and work-organization.

6. All training for field technicians must be justified on the impact training will have on sub-programs. One should continuously devote the major in-service training effort of the Sector and the Institutions to field technicians.

7. Administrative Personnel usually bring considerable technical competence to their jobs. Their in-service needs lie in the area of human relations and work organization.

8. A wide range of competence exists in office personnel. Much of the ultimate productivity of any unit often rests on the effectiveness of office workers. Thus in-service training for their group is very important.

9. Skilled labor usually brings the needed technical competence to the job. One should place skilled labor training below the priority of training for tech-

nical field workers, supervisors and office personnel.

10. Unskilled labors training needs appear to be minimal for the tasks they are called on to perform. The Sector in concert with other agencies should work to meet the personal training needs of unskilled labor.

ORGANIZATION

The complex organization of the Sector requires both centralized and decentralized training functions for Sector personnel.

Figure 1 graphically portrays the organization which combines both the centralized and decentralized functions. Effective Sector-wide coordination is needed. The Agricultural Sector Planning Unit is designated to provide Sector-wide coordination. Attention is also called to the administration of the Amatitlán Center by the Agricultural Sector Planning Unit.

Figure 2 shows the organization of the Sector Planning Unit for training in relation to the six institutions and other agencies.

Figure 3 illustrates the structure of training units at each Institution and shows relationships to the Agricultural Sector Planning Unit, other Institutions and outside resources.

The Agricultural Sector Planning Unit would perform the following functions:

1. Identify the general training needs.
2. Plan training activities to meet Institution needs.
3. Stimulate and encourage training activities through participating in the design of specific training activities for each Institution.
4. Assist the Institution training units in organizing and carrying out their training programs.

5. Program the use of available human and physical resources within the Institution that are available for training and arrange through the Sector Agricultural Planning Unit for other needed resources and facilities.

6. Provide for evaluation and reporting results of training.

7. Prepare budgets needed for training activities.

IMPLEMENTATION

The value of Sector human resources must be recognized in training. Four problems need constant attention as training programs are planned and implemented.

1. Lack of appreciation of the investment in human resources.

2. Lack of appreciation of training as a dynamic process.

3. Lack of imagination in seeing and using the training resources available.

4. Lack of appreciation of the in-house capability of training and human resource development.

Strong and competent training leadership is needed to implement and maintain training at both the Sector and Institution levels.

TRAINING COORDINATION SECTOR LEVEL

1. Identify the training needs

The Agricultural Sector Planning Unit in coordination with the Institution training personnel will identify the general needs of the Sector employees.

2. Plan training activities to meet Institution needs

The Sector Inter-Institutional Coordination Committee for Training will in conjunction with Institution administrative personnel translate training needs into projects and place the projects on a priority basis for the ten job classifications.

3. Stimulate and encourage training activities

The Agricultural Sector Planning Unit working with the committee of Inter-Institution coordinators would design specific training activities for each Institution.

4. Assist the Institution in organizing and carrying out their training program

Using the principle of sharing resources the Unit would help each Institution staff developg high quality training sub-projects and activities.

5. Coordinate the use of facilities and equipment available for training

Two types of facilities require coordination. One is the Amatitlán Center. The other involves such facilities as the DIGESA regional training centers, conference rooms, laboratories, meeting halls, and ICTA field test plots. Coordination will provide for maximum use of resources and thus extend the effectiveness of training.

6. Coordinate the design of materials to be used in the training programs of each Institution

Additional instructional material will be needed. Especifically printed, and duplicated materials, films, filmstrips, slides, transparencies, charts and posters.

The Agricultural Sector Planning Unit will coordinate the design of materials including radio programs.

7. Offer its own human and physical resources in order to realize general training activities

8. Convene work meetings of Institution coordinators every second week

9. Evaluate the general pre- and in-service training programs

GENERAL COMMENTS

1. The Agricultural Sector Planning Unit has

broad training leadership and coordination functions to perform.

2. A staff of head coordinator, two assistants and a secretary are needed in the Agricultural Sector Planning Unit.

3. Sufficient office operating and travel budgets are needed to carry out the coordinating functions.

4. A budget is needed to modernize the Amatitlán Center and maintain its operation.

INSTITUTIONAL TRAINING FUNCTIONS

1. The training unit will report directly to the Director General, President or Manager of its respective Institution and work closely with the Agricultural Sector Planning Unit.

2. Identify, in conjunction with the Agricultural Sector Planning Unit specific sector training needs.

The procedure for identifying these needs should include classification of all personnel by job functions, identification of capabilities (knowledge and skills), diagnostic assessment and establishment of training priorities.

3. Plan and schedule specific Institution training activities on a priority basis according to identified training needs.

4. Organize and carry out the specialized training activities as required.

5. Program the use of available human and physical resources within the Institution that are available for training and arrange through the Agricultural Sector Planning Unit for other needed resources and facilities.

6. Provide for evaluation and reporting results of training.

7. Prepare budgets needed for training activities.

COMMENTS

Training sub-projects could be developed in response to functional classifications of employees scheduled to receive training and the topical grouping of training objectives. Sub-projects could include:

Regional supervisors	-	Middle management training (using time effectively)
Secretaries	-	Vocational training (short-hand skills)
Mechanics	-	Vocational training (engine tune up)
Field Technicians	-	Technical training (use of commercial fertilizer)
Field Technicians	-	Communication (speaking before groups)
Research Technicians	-	Advanced technical training (cross breeding of corn)

The following five training methodologies should meet most of the training needs:

1. Informal self-study
2. Directed self-study
3. Directed on-the-job training
4. Formal short courses, conferences and skills courses
5. Advanced academic training.

The original report contained a detailed example of a training sub-project in order to illustrate the use of the above procedures. It is included below in summary form:

Sub-Project: Technical training - Field technicians-Entomology and Pathology. State training objectives, plan training activities, identify resources to be employed, schedule training activities and prepare the budget.

Expanded plan - Training objectives:

1. All field technicians must be able to accurately identify the insects and diseases which cause economic damage in their region, know both the common as well as the scientifice names of pests and diseases in their region, be familiar with the life cycles of the pests and diseases.

2. All field technicians should assemble literature which indicates alternative control systems and should know by memory the specific dosages and application schedules recommended for the control products which are available locally.

Training activities

Field training sessions will be held by sub-regions and by sub-programs at which insects and diseases will be identified under normal growing conditions. Field training sessions will be immediately followed by a review of control measures.

Resources to be employed

Instructors will be provided from among ICTA entomologists and pathologists. Local field technicians will assist the instructors in locating fields to be visited. Transportation will be needed to move participants from one field observation point to another. A meeting place or classroom will be needed for follow-up sessions on control measures.

Schedule of training activities

Sessions must be held during the growing seasons. The recommended number of participants for each sessions is 20 to 40. Each session will last one day. Instructors should budget to days per session, one day travel time to survey fields andone day for field session and review of control measures. All field technicians will be required attend the sessions.

Proposed budget

Number of proposed training sessions: 20

Total number of proposed participants: 20

Instructional days (to be provided by ICTA)

Pathologist - instructors (ICTA) 2 days x 20=40 days

Entomologist - instructors (ICTA) 2 days x 20=40 days

Total instructional time: 80 days

Direct expenses:

Per-diem, 480 days x $7/day =		$3,360
Rent of charter buses, 20 sessions x 1 day x $30 per day	=	600
Preparation of materials	=	600
Total direct costs		$4,560

SPECIAL RECOMMENDATIONS

1. The Amatitlán Training Center should be repaired and utilized for Sector Training.

2. Equipment should be provided to each institution. (Detailed lists are on file.)

3. It is proposed that the project provide instructional aids such as 35 mm. slide film, transparencies & charts for the first two years. Capacity to reproduce materials is needed. However, emphasis needs to be placed on action laboratory training type activities which require maximum involvement of the trainee in the subject matter and skills needed for job performance.

Costs for the pre- and in-service training program were presented in the original report for the four calendar years, 1976-1980. It was proposed that the program be funded jointly by the Government of Guatemala and USAID loan funds.

Loan funds would be used to employ training coordinator personnel in the six Institutions, for training equipment and supplies, for the modernization of the Amatitlán Training Center and contracting local technical assistance. Modernization of the Amatitlán Training Center was recommended at a cost of approximately $15,000 from

the Government of Guatemala.

It was proposed that training personnel and certain training supplies be fully funded by the loan for the first two years with one-half funding the third year and none the fourth year. The Government of Guatemala would provide training supplies, office supplies and vehicle operation and maintenance funds including vehicle operation and maintenance for the technical advisors from the beginning of the program.

Finally, it was recommended that grant funds be used to employ two technical advisors and one secretary for 1976-1978. The technical advisors would assist the Government of Guatemala in training the trainers, establishing the pre- and in-service program and conducting the program. Short-term technical assistance is to be provided if needed to supplement the expertise of the two full-time advisors.

Budget details and a specific schedule of training course recommendations broken out by personal category formed a part of the original report but are not included in this summary.

TABLE I. Number and Classification of Employees in Sector Institutions

Institution:	Job Classifications: * 1	2	3	4	5	6	7	8	Sub-total	9**	10**	Total**
BANDESA	20	26	57	0	24	79	206	101	513	87	70	670
DIGESA	22	12	205	102	155	514	97	595	1702	2388		4090
ICTA	2	10	7	83	24	0	41	31	198	70	1	269
INAFOR	14	16	26	12	15	5	26	56	170	120	33	323
INDECA	6	16	31	0	3	44	40	77	217	53	62	332
INTA	8	65	18	0	25	65	39	108	328	237	256	821
Total:	72	145	344	197	246	707	449	968	3128	3377		6505

* Key:
1 - Executive
2 - Executive-Administrator
3 - Supervisor
4 - Research Technician
5 - Service Technician
6 - Field Technician
7 - Administrative Personnel
8 - Office Personnel
9 - Skilled Labor
10 - Unskilled Labor

** Estimated

/bb

TABLE II: Academic Preparation of Employees in Sector Institutions

	PhD	Master	Bachelor	Secondary	Primary	Below Primary	Total
BANDESA	1	0	15	429	225	0	670
DIGESA	0	13	136	1498	191	2252	4090
ICTA	1	13	67	98	82	8	269
INAFOR	0	1	27	127	143	25	323
INDECA	0	1	30	169	132	0	332
INTA	0	0	17	291	513	0	821
Total:	2	28	292	2612	1286	2285	6505

TABLE III Geographic Level of Responsibility of Employees in Sector Institutions

	National	Regional	Local	Non-Determinable	Total
BANDESA	77	44	549	0	670
DIGESA	744	627	219	2500*	4090
ICTA	31	19	219	0	269
INAFOR	138	22	163	0	323
INDECA	181	98	53	0	332
INTA	46	145	630	0	821
Total:	1217	955	1833	2500	6505

*Temporary Contract Labor

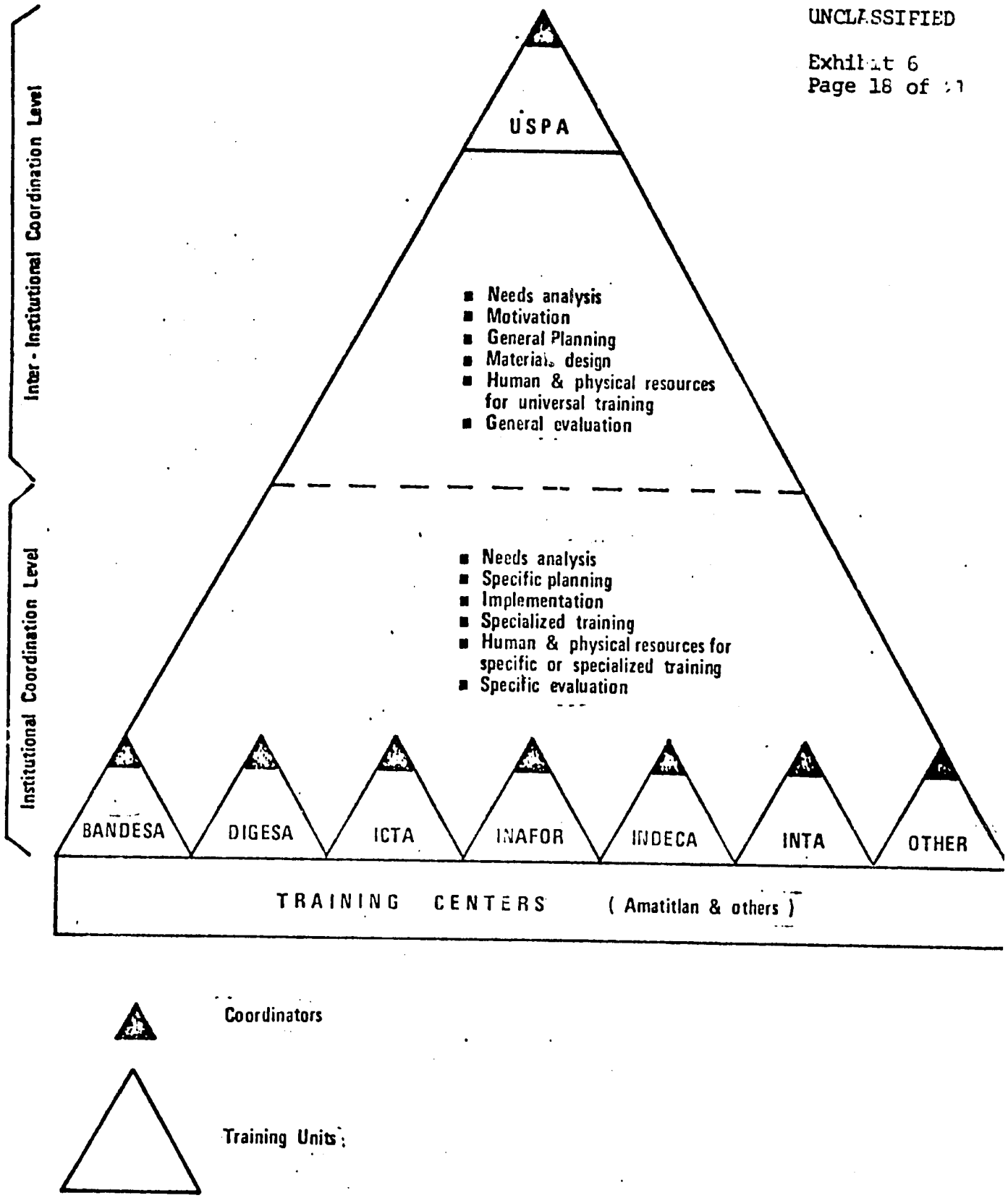

FIGURE 1. General structure of Inter-Institutional organization of the Pre & In-Service Training Program for the Agricultural Public Sector

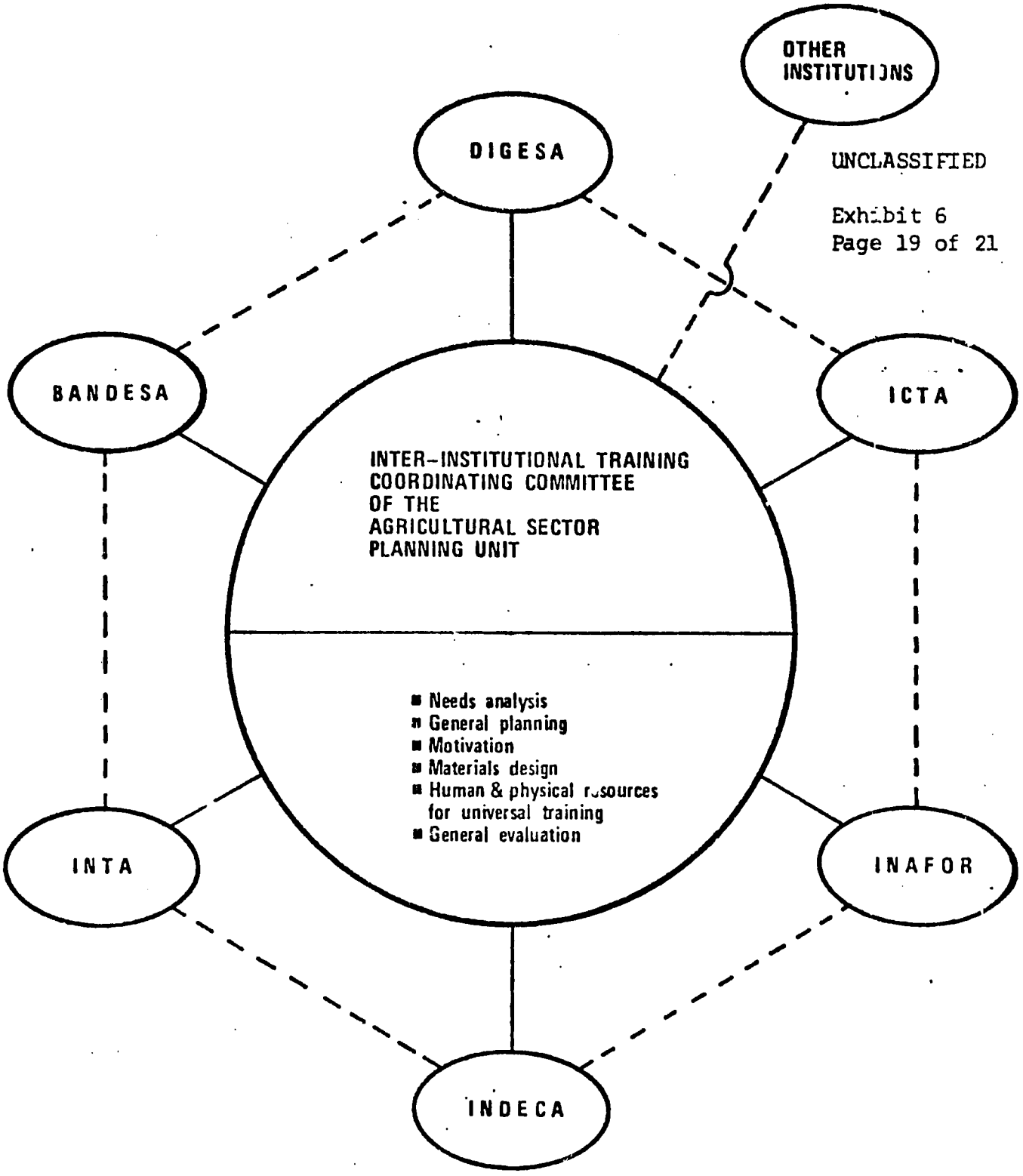

FIGURE 2 Coordination structure of Pre & In-Service Training for the Agricultural Public Sector

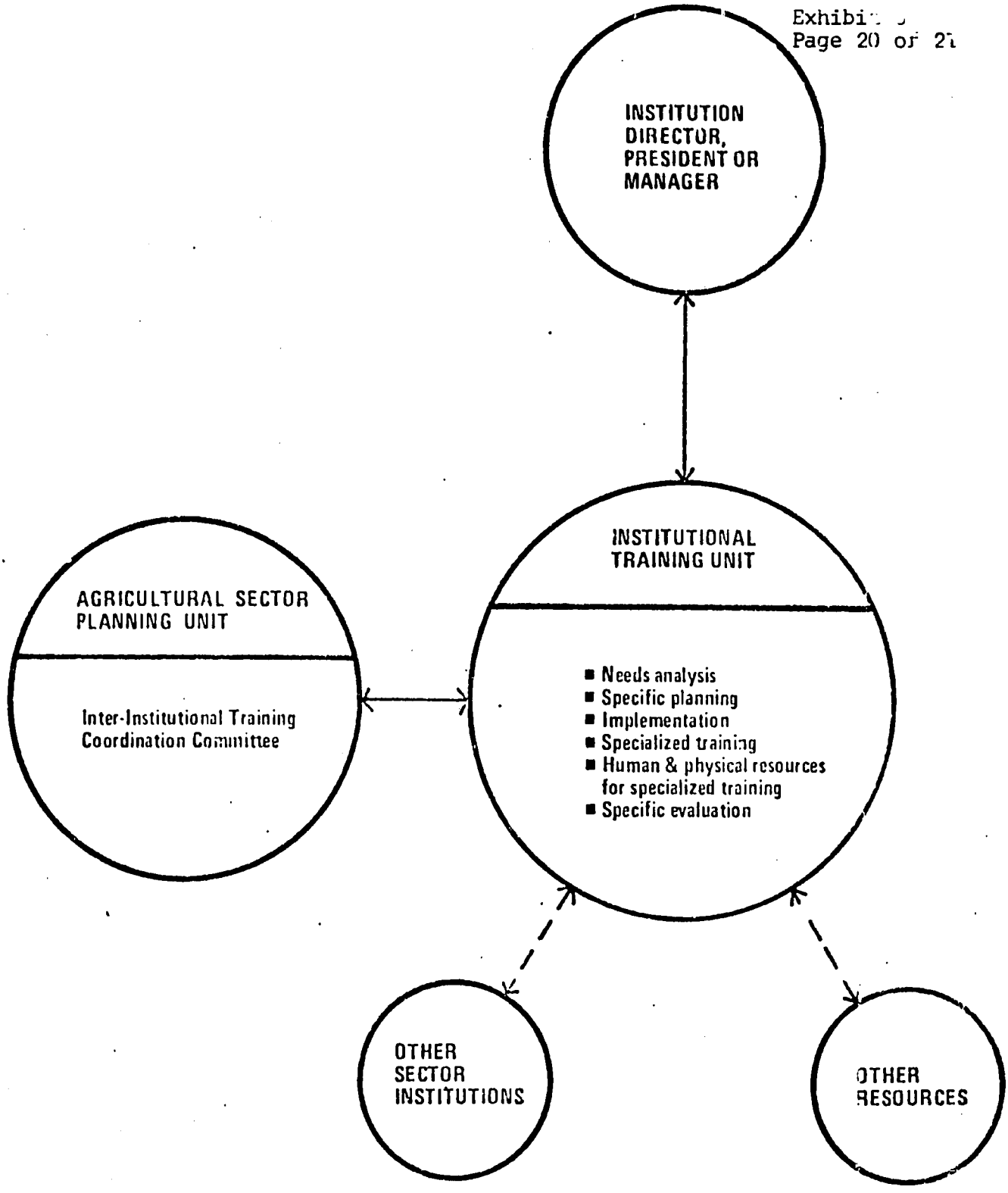

FIGURE 3. Structure of Pre & In-Service Training Units in Sector Institutions

A. TABULATION OF SAMPLE RESPONDING TO QUESTIONNAIRE

PROFESSIONAL TITLE AND JOB TITLE

Utilizing the following three point scale please rank these personnel capabilities according to their importance in effective job performance

1- Indispensable 2- Important 3- Not necessary

	1 EXECUTIVES			2 ADMINISTRATIVE EXECUTIVES			3 SUPERVISORS			4 RESEARCH TECHNICIANS			5 SERVICE TECHNICIANS			6 FIELD TECHNICIANS			7 ADMINISTRATIVE PERSONNEL			8 OFFICE STAFF		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
I. ORIENTATION																								
A. Sectoral																								
1. Sector	5	1		11	5	5	9	4	3	2	4	4	2	10	3	4		2	5	5	3	1	9	8
2. Institution	6	1		12	6	2	11	5	1	3	7		8	7		1	2	2	9	2	2	10	8	3
3. Program	6	1		12	6	2	11	3	2	5	5		4	7	3	1		4	4	4	5	6	6	5
4. Sub-program	5	1		9	4	5	9	3	4	6	5		6	4	5			5	3	4	6	4	5	9
B. Geographical knowledge of agriculture field																								
1. National	5	2		14	7		12	4	2	3	6	2	7	7	2	2	3	1	7	5	1	3	8	8
2. Regional	3	4		7	8	5	9	4	5	4	7		6	8	2	1		4	3	5	5	1	7	10
3. Local	1	1	2	5	5	9	10	1	3	7	2		4	8	4			5	5	3	5	2	5	11
II. ADMINISTRATIVE CAPABILITY																								
A. Planning	6	2		12	6	2	12	3	2	2	7	1	3	7	4	2	1	2	8	3	2	2	4	9
B. Programming	5	3		12	5	3	11	3	2	5	5	1	6	6	4	2	2	2	6	3	4	3	7	9
C. Personnel selection	3	3	2	7	9	4	6	7	4	5	5	1	2	1	12		2	3	5	2	5		3	11
D. Program management	5	3		12	5	3	12	2	1	7	4		5	3	8	4		2	6	5	1		3	10
E. Personnel management	3	3	2	9	8	3	7	7	2	6	5		3	2	8		1	4	6	4	3		3	11
F. Program evaluation	6	2		9	9	2	10	3	3	6	3	2	4	9	5	3	1	2	5	2	6			13
G. Personnel Evaluation	3	3	2	7	10	4	6	8	4	4	6	1	1	2	12		1	4	3	6	3		1	12
III. TECHNICAL CAPABILITY																								
A. Knowledge necessary in field of:																								
1. Agronomy	5	2		6	6	6	13	4		8	2		4	6	6	4	1	1	5	2	8	1	5	6
2. Veterinary Science and Zootechnics	2	2	3	3	2	13	1	7	8	2	4	4	2	2	10	1	2	3	1	2	9		1	13
3. Economics	3	5		4	6	9	4	6	6	1	7	1	7	3	6	1	2	3	5	3	5		5	10
4. Engineering	2	3	2	5	3	9	1	2	13	2	4	4	5	4	5		3	3		4	8			13
5. Education	3	3	1	7	8	6	3	6	6	1	8	2	1	4	8	1	3	2		6	6	2	3	12
6. Forestry	1	4	2	7	3	8	4	2	11		5	4	1	1	11	2	1	2		3	9			11
7. Rural Development	3	3		3	10	5	8	6	2	1	6	3	5	5	5	3	1	2	1	4	8		5	12
B. Level of Academic Achievement Required																								
1. PhD	2	1		2	1	7		4	9	1	8	6	1	1	10			5			10			15
2. Masters	2	2		5		7	1	6	6	3	5	2	1	2	10			5			10			15
3. BA or BS degree	5	1		11	3	2	9	2	5	5	2	2	5		9	2		4	6	1	4			15
4. Secondary Education	2	1		8	1	3	5	2	2	7	1		10	3	2	4	1	1	8	2	2	19	3	
5. Primary	1	1		1		5		1	2	4	1		6	2	2	1		4	2	1	4	5		4
C. Principal Technical Function																								
1. Extension	1	2	3	2	8	6	6	10	1	1	7	3	4	2	8	3	1	2	1	3	6	1	3	12
2. Promotion	2	1	2	2	7	7	7	3	7		8	2	3	3	8	1	2	3	1	3	6	1	1	13
3. Research	3	2	1	6	5	6	9	5	3	9	2	1	3	7	7	2	2	1	5	2	5	3	1	12
4. Education	3	2	1	4	8	7	5	7	5	1	8	2	2	6	7	1	2	3	4	2	5	3	1	13
5. Secretarial		1	2	1	2	12	2	1	10		5	5		5	8	2	1	3	3	4	4	12	3	4
IV. CAPABILITY AT THE PLANT LEVEL																								
A. Secretarial		2	1	3	2	9	3	1	6		3	6	2	4	8		3	2	3	5	3	13	3	3
B. Mechanical			2	1	2	10	5	2	6	2	6	1	3	2	7			5		6	5	1	2	13
C. Crop management	1	1	1	4	3	7	8	3	5	5	6		2	5	9	1	1	4	3		8			15
D. Livestock management			2	1		13	2	2	8	2	2	4	2	2	10		2	3	1	1	9			15
V. INDIVIDUAL CAPABILITY																								
A. Human relations	6	1		4	6		5	4		8	3		5	6	4	4	2		10	3		17	4	1
B. Oral and written communication	7						11	3	1	6	5		9	7	1	3	2	1	9	3	1	19	1	2
C. Work organization	7			10	4		14	4		9	2		11	3	1	3	3		11	2		19	2	1

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P R E A L C

A PROPOSAL FOR A STUDY PROGRAMME ON THE DEVELOPMENT AND IMPLEMENTATION OF LABOUR-INTENSIVE METHODS IN RURAL ACCESS ROAD CONSTRUCTION IN GUATEMALA

This study programme will be carried out in collaboration with the Dirección General de Caminos, the Inter-american Development Bank and U.S. Agency for International Development.

CONTENTS

1. Introduction

1.1 Background and Project Justification

1.2 The USAID Programme

2. Principal Aspects and Objectives of the Study

2.1 The Major Factors

2.1.1 Techniques and Standards

2.1.2 Administration

2.1.3 Organization and Management

2.1.4 Cost Effectiveness

2.2 USAID Pilot Projects

2.3 Objectives

3. Plan of Work

4. Staff

5. Budget

1. Background and Project-Justification

1.1 In common with many developing countries, Guatemala is in the process ob building up its infrastructure to provide the basis for development. One important element in this infrastructure development is the establishmente of an efficient road network. This network will not only provide a stimulus to the export of agricultural products such as coffee, sugar and cotton but will also serve the socio-economic needs of the population in terms of better communications, access to schools, hospitals and social services.

In the National Development Plan for 1975/79 the Government envisages investing $130 M. in road construction and the major proportion of this will be spent on major roads. Nevertheless it is appreciated that a fully integrated road network does not only consist of the major road links but also the secondary and rural access roads. Consequently, some 10% of the total investment, Q.12.6 M, will be used for the construction of rural access roads. These roads not only provide an outlet for exportable crops; they also provide the opportunity for increased grain production and the diversification of crop production. Further, they provide a means of access for the rural communities to social services, agricultural extension services and information. In a fully integrated road network therefore the establishment of an effective system of tertiary or access roads can lay the basis for improved agricultural output and a higher standard of living for the rural population. In Guatemala the areas of the greatest rural population density are also those which have the lowest agricultural production per hectare and have the highest proportion of landless' workers. Overall the National Development Plan estimates that as much as 42% of the rural population is either unemployed or underemployed.

In the Plan, it is suggested that those infrastructure projects that utilize labor intensive techniques may contribute to an increase in rural workers income and, consequently, reduce the high unemployment in the

rural areas. This is indicated in the Plan, as follows:

"One of the main problems in the rural areas is the incapability to generate enough employment sources in the present circumstances for the existing population; moreover, in the future, if adequate steps are not taken, the unemployment and underemployment situation will be aggravated." Therefore, it is recommended that:"One of the policies of distribution should be the execution of public works on a large scale, which could be located in specific geographical areas, to help in reaching the goals herein proposed. This policy creates additional employment sources in the rural areas, but with no link with the agricultural activities; it would offer the advantage of adapting itself to the periods in which seasonal unemployment occurs. This would prevent the migration and would lessen its negative consequences such as school drop-outs, family desintegration, and new ways of life that do not agree with those used by the original community".

A programme of access road construction which was orientated towards the use of labour-intensive techniques should therefore receive particular consideration.

Apart from the overall benefits discussed above other particular benefits of such a programme would be:

a. Employment would be created for the rural unemployed and under-employed;

b. The use of machines for this type of road could be restricted, which would reduce the foreign exchange costs of construction;

c. Roads could be built in areas where it would normally be difficult and uneconomic to utilise machinery.

It would appear, therefore, that the areas in which there is the greatest need for a system of access roads are also those which have the highest unemployment and underemployment. Construction methods which utilise a high proportion of labour would seem to be appropriate. It is in this context that the Government of Guatemala has requested PREALC to carry out a study

which would evaluate the feasibility of using labour-intensive techniques for the construction of rural access roads. It is envisaged that IDB would provide the financing for such a study.

It should be recogised that considerable experience has been gained in recent years in the use of more labour-intensive techniques in road construction. Studies carried out in Irán, Nepal, Thailand, Philippines, Pakistan, Kenya, India and Indonesia have all indicated that these techniques are a viable alternative particularly for the construction of low volume roads. The studies also showed however that whereas it was originally envisaged that the major problem in the use of labour-intensive methods would be the identification of efficient techniques what is more important is to create the right framework or environment so that the identified techniques can achieve their potential. Thus, detailed consideration must be given to site organization and management, design standards, labour supply and demand and the administrative framework for the efficient implementation of projects.

1.2 The USAID Programme

Within the terms of an overall aid programme to the Guatemalan Government, it is proposed that USAID will provide $4 million for the construction of rural access roads over a 5 year period. The methods used in the construction of these roads will be as labour-intensive as is commesurate with economic and technical efficiency. The exact location of the proposed roads is still under discussion, however the selection criteria will include considerations of employment creation and increased income for the poorest members of the rural community.

This programme is therefore completely in accord with the objectives of the National Development Plan and will be integrated into the road construction programme of the Dirección General de Caminos. In the initial stages of the USAID programme, one of the principal factors to be evaluated will be

the most effective technical and administrative framework for the efficient implementation of the programme.

The loan application has been submitted and will be evaluated in the near future. It is envisaged that approval will be forthcoming towards the end of 1975.

2. Principal Aspects and Objectives of the Study Programme

2.1 The Major Factors

2.1.1 Techniques and Standards

In Guatemala there is no strong tradition of the use of labour-intensive techniques. Certain road works have been carried out using these methods but in general this has not been part of a co-ordinated plan but rather the reflection of the desire of the local people to construct a reasonable facility in the particular area. 1/ The data available suggests that where labour-intensive techniques have been used they are considerably more expensive, both in time and money, than equipment intensive methods. It should be remembered, however, that the increase in productivity required to make these techniques viable in Guatemala is well within the range produced in the studies already referred to by improved techniques, supervision and organization. Further, a preliminary evaluation suggests that there are techniques that could be used. For instance, the wheelbarrow (carretilla) is in common use in the rural areas. This has been shown elsewhere to be an efficient hauling vehicle for short distances. Mules and horses are used as pack

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1/ One major exception to this is that there is a clear tradition of constructing cobblestone roads, particularly in the urban areas. These roads are well constructed and are particularly labour-intensive.

animals and for pulling small, wheeled carts. For short haulage distance in difficult terrains the mule can be used for transporting material. For longer haul distances forms of animal drawn vehicles are already being used in the rural areas. The agricultural tools such as the azada are perfectly capable of being used in construction work. All this augers well for the development of labour-intensive techniques.

The other important technical consideration is the standard of road that is required. Too high a standard will require a high initial cost and may preclude the use of labour-intensive techniques. Too low a standard may drastically reduce the life of the road and incur heavy maintenance costs. There is therefore some form of trade-off between the initial construction costs and the future maintenance and operating costs. A further aspect is that access roads do not generally come high in the list of priorities for maintenance activities and in a country with a shortage of funds for maintenance of roads it is likely that recurrent maintenance will be minimal. Moreover the high rainfall makes it imperative that due consideration is given to adequate drainage. In summary, it is necessary to pose the question ¿what is the objective of the construction of the road and what standard will achieve that objective? For example, if an access road is required to be passable by trucks for only 9 months of the year there is little value in providing an all weather road complete with bridge structures etc. On the other hand, if a road must be passable at the end of the wet season to extract marketable crops then adequate allowance must be made for drainage to ensure that the road is in good condition at that time.

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Page

2.1.1 Administration

The construction of access roads is presently undertaken by various organisations. The maintenance department of the Dirección General de Caminos constructs some access roads through its maintenance budget. However other organisations such as the Army, INTA, the Electrification Institute and private farmers are also involved in their construction. There is, therefore, no formal organisation charged with the overall responsibility for these roads.

Any large scale programme for the construction of access roads by labour-intensive methods would have to have a well structured organisation for its implementation. This does not presently exist in Guatemala. There would be many advantages in providing such an organisation. First the overall direction and evaluation of the programme would be concentrated in one particular unit. Second any financing would be controlled by the central unit which would allocate funds throughout the programme as required. Third, there would be a direct link between all the various activities of the programme throughout the country. Fourth, any results and recommendations on techniques or work organisation could be communicated from the unit to each section carrying out the programme. In total it could provide the direction and coordination of the programme.

An example of the administrative arrangement that may be worthy of further investigation could be as follows: the overall operational management of the programme would be situated in the DGC. The responsibility for the programme should rest with one senior engineer only. The staff of the unit of which this engineer is in charge at headquarters would deal with the overall administration,

the provision of any necessary equipment, the evaluation of cost and methods and the operational management. The actual construction of the roads could be carried out by various units or sections which would be located in the rural areas. These sections would be given the responsibility of constructing certain lengths of access road within their area. Let us say that each section would construct 30 kms. of road each year. Given reasonable productivity a group of 50 labourers with 5 foremen can produce 8 kms. in a year. Thus each section would have four groups supervised by the section chief. The number of such sections throughout the country would depend upon the financial and human resources available. The administration of any labour-intensive programme requires a fairly detailed organisational structure. There are, therefore limitations imposed by the administrative capacity of the supervising organisation.

2.1.3 Organisation and management

The results of the studies already undertaken have clearly indicated that the productivity of labour-intensive techniques can be greatly increased by the correct organisation of the work. These studies have also shown that one cannot assume that the site organisation that is effective for equipment-intensive operations will be equally effective for labour-intensive methods. The organisation of work needs to be no less sophisticated but it needs to orientate itself to the management of men. There are problems of logistics, of supervision and of recruitment which must be overcome. Further, the sequence of construction activities can be phased so that the productivity is maximized. The relationship between the various different tasks that are involved in a complete activity is also important. For instance the activity

of excavation, loading, hauling and unloading of earth requires detailed analysis so that there is a correct balance between each individual task. This ensures that the labour used in excavation is not waiting for the return of hauling vehicles and vice versa. Further, if equipment has to be used for such operations as compaction and grading then care must be taken to balance the output of labour with that of the equipment.

2.1.4 Cost effectiveness

In the final analysis the evaluation of labour-intensive techniques must consider whether they are economically viable. This is true whether one makes an analysis at market prices or using a system of opportunity costs which tries to reflect more accurately the use of labour, local capital and foreign exchange.

The cost analysis of labour-intensive techniques is relatively straight-forward. The cost of each activity can be calculated from fairly aggregated data on input and output, due allowance being made for supervision and administrative costs. To compare the cost of these techniques with the equivalent equipment-intensive operations is more difficult because of the problems involved in calculating the real cost of equipment. Generally speaking the utilization rate of equipment in practice is much lower than is appreciated in cost comparisons. Further the depreciation of equipment in most developing countries is very high. Consequently, unless a realistic assessment is made of depreciation and utilization the reported cost of equipment-intensive operations will be underestimated.

2.2 The USAID Pilot-Projects

It is considered that the study programme will have far greatest impact and benefit if the recommendations and guidelines that emanate from the study were based on practical experience in Guatemala. In their attempt to ensure that their access roads programme achieves its full potential, USAID has proposed that the initial construction projects will be used as pilot projects. That is, during the construction of these 3 or 4 projects an attempt will be made to develop and implement the most suitable environment for the maximizing of labour productivity. This will involve consideration of all the major factors discussed in section 2.1.

In the light of this it has been agreed with AID that a major portion of the study programme proposed here would centre on the pilot projects embodied in the USAID programme. The study team would thereforme collaborate closely with USAID in the implementation of the study programme in that it would carry out the work of the development of a viable framework for efficient labour-intensive techniques on the pilot projects financed by USAID.

2.3 Objectives

The main objectives of the study programme would be as follows:

a. To study and evaluate the labour-intensive techniques presently being used in Guatemala, to asses their efficiency in particular road construction activities and to make recommendations as to the possible improvement, adaptation and modification of existing tools and equipment;

b. To make an assesment of the potential of the local manufacturing sector to produce the tools and equipment required for the implementation of a labour-intensive construction programme;

c. To evaluate the most effective work organisation which will maximize labour productivity;

d. To make recommendations on the appropriate design standards for rural access roads;

e. To provide detailed recommendations on the most appropriate administrati framework for the implementation of the programme both at government and local levels;

f. To assess the potential employment creation, both direct and indirect, from the use of labour-intensive techniques;

g. To assess the implications of the use of alternative techniques on labour demand and supply;

h. To make an economic evaluation of the feasibility of the use of labor intensive techniques;

i. To assess the implications of the use of these techniques in terms of the requirement for supervision and training.

3. Plan of Work

The study will be carried out by a team of 3 consultants and 2 assistants. They will work intimately with the Dirección General de Caminos (DGC). It is recommended that a consultative committee be set up. This committee would consist of the study team project manager, a senior representative of both the Planning Unit and the Construction Department of the DGC and a representative of AID, IDB and CNPE.[1/] The project manager would, of course, have overall responsibility for the study programme. However, the setting up of a consultative committee would ensure that all interested parties were fully involved in the study programme and also that the maximum benefit would accrue to the Governmet of Guatemala and in particular, the DGC.

1/ Consejo Nacional de Planificación Económica.

The construction department of the DGC will have the executive responsibility for the pilot projects to be constructed under the AID programme. A unit will be established in the Construction Department which will supervise the projects. The project manager of the study programme will work in close consultation with the head of this unit who will be designated by the DGC. This collaboration will particularly relate to such matters as the resources required and possible modifications and adaptations that will be implemented in the pilot projects.

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The study programme will effectively be in four phases.

Phase I - Preliminary Planning (1 month) - In this phase the study team will prepare a detailed work plan for the study programme. It will also prepare the basis for the work to be carried out in the pilot projects.

Phase II - Pilot projects (3 months) - The study team will be fully involved during this phase with the development and implementation of efficient labour-intensive techniques in the pilot projects. It will also evaluate the most effective form of site organisation and management and access the administrative structure necessary for the effective implementation of future projects. During this phase the study team will carry out detailed data collection on the techniques that are implemented. The exact timing and duration of this phase will depend to a great extent on the time of year at which the study commences as during the wet season construction activity is severely limited.

Phase III - Evaluation (4 months) - This phase will be particularly concerned with drawing together the results from the pilot projects together with all other relevant information so that policy guidelines and recommendations can be made on all factors detailed in the objectives of the study.

Phase IV - Final Report (1 month) - In this phase a final report will be produced which will be presented by PREALC bo the Covernment of Guatemala.

4. Staff

The study programme will be carried out over a 9 month period by a team of 3 consultants and 2 assistants. The personnel will be as follows:

Project Manager (9 months) - A civil Engineer with a detailed knowledge of labour-intensive techniques and their implementation. He should also have some understanding of economies.

Hardware Development-Specialist (5 months) - He should have some knowledge of labour-intensive techniques and road construction. More important, however, he must be capable of providing practial recommendations on the adaptation, modification, development and manufacture of tools and equipment for use in construction work.

Organisation and Management Specialist (3 months) - He should have an understanding of Civil Engineering Construction. Principally, however, he should have practical experience in management problems, particularly in developing countries.

Assistant Engineer/Economist (9 months) - He should be an economist with experience of Civil Engineering. He will undertake, under the direction of the Project Manager, the economic evaluation of labour-intensive techniques both in detail and in terms of their wider socio-economic consequences. This will also involve some assessment of labour supply and mobility.

Assistant Engineer (9 months) - He will be involved with the collection and analysis of data on labour-intensive techniques and to a lesser extent on equipment.

It is expected that the two assistants will be Associate Experts provided by bilateral donors at no cost to the study programme.

Government Counterpart Support

The Government will provide the following counterpart personnel:

a) One Civil Engineer from the Dirección General de Caminos who will work closely with the Project Manager for the duration of the study programme.

b) One Economist from CNPE who will assist in data collection and evaluation for a period of 6 months.

c) Two technicians from the Dirección General de Caminos who will be involved in detailed data collection and evaluation during the period of the Pilot Project Phase and Phase III. A tentative plan of work and staff allocation is shown in Figure 1.

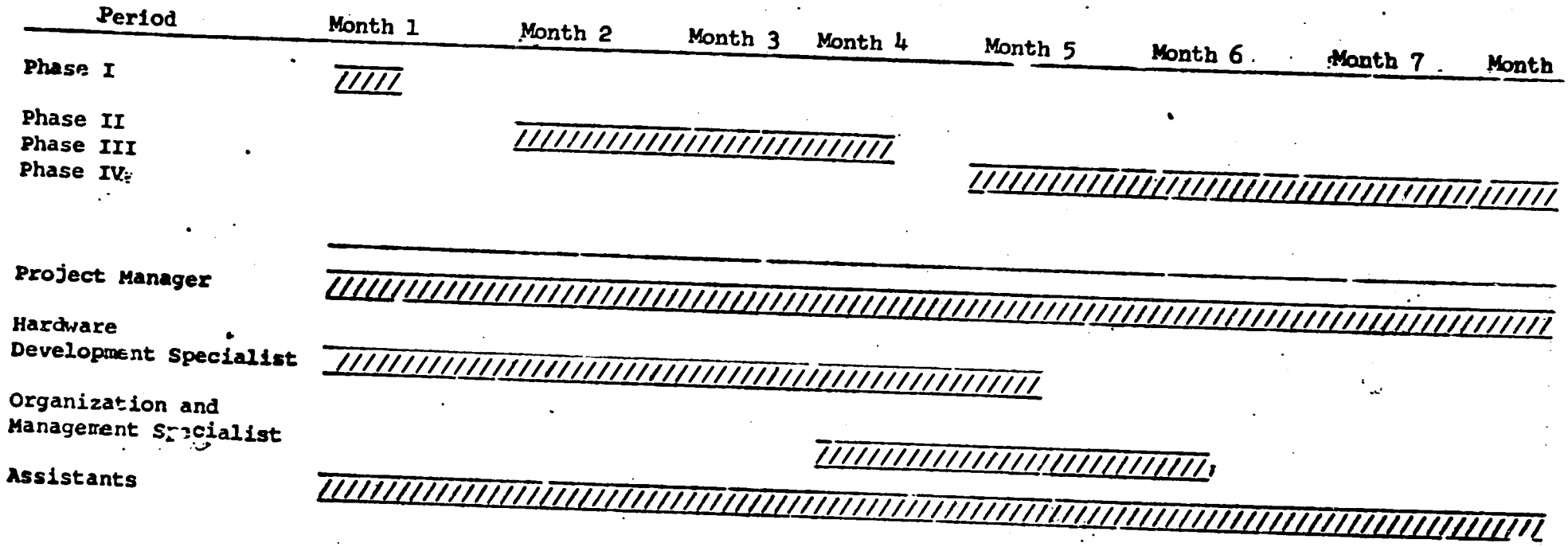

Figure 1. Work Plan and Staff Schedule

Exhibit 7
Page 1 of 36

5. BUDGET

Study Programme	IDB Contribution	Government Contribution
1. Project Manager-9 man months at $3,000 per month	$27,000	
2. Hardware Development Specialist 5 man months at $3000 per month	15,000	
3. Organization and Management Specialist 3 man months at $3000 per month	9,000	
4. 6 Return Air Tickets at $1,200	7,200	
5. Daily Allowance - 520 days at $30 per day	15,600	
6. Equipment	5,000	
7. Internal Travel including purchase of project-vehicle	9,000	
8. Administration, Documentation, and Miscellaneous	11,000	
Government Contribution		
1. One Civil Engineer for 9 months at the equivalent of $900 per month.		$8,100
2. One Economist for 6 months at the equivalent of $900 per month.		5,400
3. Two techinicians for 6 months at the equivalent of $500 per month.		6,000
TOTAL	$98,800	$19,500

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Exhibit 7
Page 19 of 30

P R E A L C

An organizational structure for the Implementation of a Rural Access Roads Programme in Guatemala

Geneva
November 1975

CONTENTS

		Page
1.	Introduction	1
2.	Access Road Construction Programme	2
3.	Existing Organisations	3
4.	The Access Roads Unit	7
5.	The Organisational Structure	8
6.	Staff	15
7.	Further work and Implementation	15
8.	Summary	16

1. Introduction

There has been a growing recognition in recent years of the value of utilising more labour-intensive methods in rural road construction. The benefits have been perceived not only in terms of increased employment and increased rural income but also in terms of the more efficient use of the available resources.

In Guatemala, the government, whilst accepting that there can be benefits from the use of labour-intensive techniques, are anxious that their use should not impair quality nor increase construction duration. A request has been made, therefore, that PREALC should carry out a study programme to assess the feasibility of these techniques in Guatemala and a proposal on this basis has now been submitted to the IDB(BID) for financial support. The study programme will be completed towards the end of 1976 and it is expected that it will provide the basis for the large scale implementation of labour-intensive techniques. Nevertheless, in the meantime the construction of access roads will continue. In particular the programme of road construction envisaged in the USAID loan application will commence in mid 1976. This is of particular importance in that this will be the first major programme of labour-intensive road construction in Guatemala. Further, the first 3 - 4 projects in the programme will be used as pilot projects in the PREALC study programme.

The implementation of any programme of access road construction assumes that there is an organisational and administrative structure already available which is capable of executing the work. As far as access roads are concerned this is, in fact, not the case in Guatemala. It is expected that the study programme will provide recommendations and guidelines on the most effective organisation, both at site level and at the Headquarters, for the implementation of a major programme of labour-intensive road construction. However, it is necessary at this stage to specify a basic organisational structure which will allow a programme of access road construction to be initiated. In defining what might be termed a 'basic-needs' structure three factors are particularly important. First, the structure must be flexible enough to allow alteration and improvement in the light of the findings of the study programme. Second, the structure must be strong enough itself to carry out the initial projects. Third, the structure must be capable of growing to accommodate future needs and expanded programmes.

In preparing this document we have also been very much aware of the physical and financial limitations which exist. We have also recognised that if the recommendations proposed here

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are to be implemented prior to the initiation of any major construction programme in mid 1976, high level action will be required in the near future. We therefore view this document as the basis for serious discussion between the Ministry of Works and Communications, Plannificacción, USAID and PREALC.

2. Access Road Construction Programme

Up to the present there has been no one organisation which has the overall responsibility for the construction of rural access roads. These roads have been constructed by, amongst others, INTA, the Electrification Institute, private farmers and the Maintenance Department of the Dirección General de Caminos. In the light of this diversification of responsibility it is not surprising that there is a little data pertaining to the amount of access roads constructed, their cost or any other major details. What is known is that (1) some 70% of the total road network of 13,500 kms. is unpaved; and (2) of the total network approximately 3,100 kms. of access roads have been built in the coffee and sugar fincas by private farmers.

The government does have an on-going programme to expand secondary rural roads; however, resources are extremely limited and most of the funds have been spent on maintenance operations. Further, most of the recent transport infrastructure investment has been made in the upgrading and paving of the major road links (Pan-American, Coastal, East-West Highways etc.).

For the foreseeable future, therefore, it is unlikely that the government itself will be able to invest large sums of money in the construction of rural access roads. However, it has been recognised that these roads are vital to the overall development of the economy. In particular the most recent USAID loan programme envisages a $4 million programme of access road construction. This involves the construction of 225 kilometres of access roads over a five-year period. It is intended that the majority of these roads will be situated in the Highlands, Oriente and Northern Lowlands regions.

This programme will break new ground in Guatemala for various reasons. To begin with it will be the first concerted effort to implement a large scale programme of access road construction. Second, it will have as one of its objectives the use of effective labour-intensive methods whenever and wherever they are not incompatible with quality and efficiency. Third, it will attempt to bring private construction into the area of access road construction.

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Fourth, the orientation of the programme is to the poorest members of the community, thus the selection criteria for the roads to be constructed are related to various socio economic factors rather than purely economic parameters. Fifth, USAID are particularly concerned that this programme will lay the basis for future rural access road programmes and in this they have the full support of the government.

An attempt is therefore being made in Guatemala to develop the tertiary road system so that a fully integrated road network can be produced. It should be recognised that until now no unified approach has been taken towards the construction of these roads and there has not yet been investment in them on the scale which is now proposed. Whilst this re-orientation of investment objectives is agreed to be in the best interests of the country, it does also imply that to implement such a programme will require an efficient organisation and administrative structure.

3. Existing organisations

It has been noted that various organisations were involved in access road construction in Guatemala. However, it seems clear that the overall responsibility should rest with the Dirección General de Caminos. Indeed it is implicit in the USAID loan programme that the DGC will expedite the programme. This organisation at present is responsible for the maintenance of all roads in Guatemala except for the private roads in the coffee and sugar fincas. It also has the highest concentration of technical expertise in road construction and is therefore technically equipped to carry out the work.

Nevertheless, it must be said that there is at present no unit within the DGC which is responsible for access road construction. The Maintenance Department does in fact construct access roads but as a minor part of its maintenance activities. Further the maintenance department is not a technical department but purely operational. It works through its units situated in the eight Zona Viales throughout the country.

The organisation diagrams of the DGC and the maintenance department are shown in figures 1 and 2. Figure 3 shows the structure of one of the Zona Viales.

From figure 1 it will be clear that the Construction Unit is a centralised organisation dealing with projects from headquarters, whereas the Maintenance Department is more de-centralised, focusing on the Zona Viales. On the other hand the construction unit has technical expertise whereas

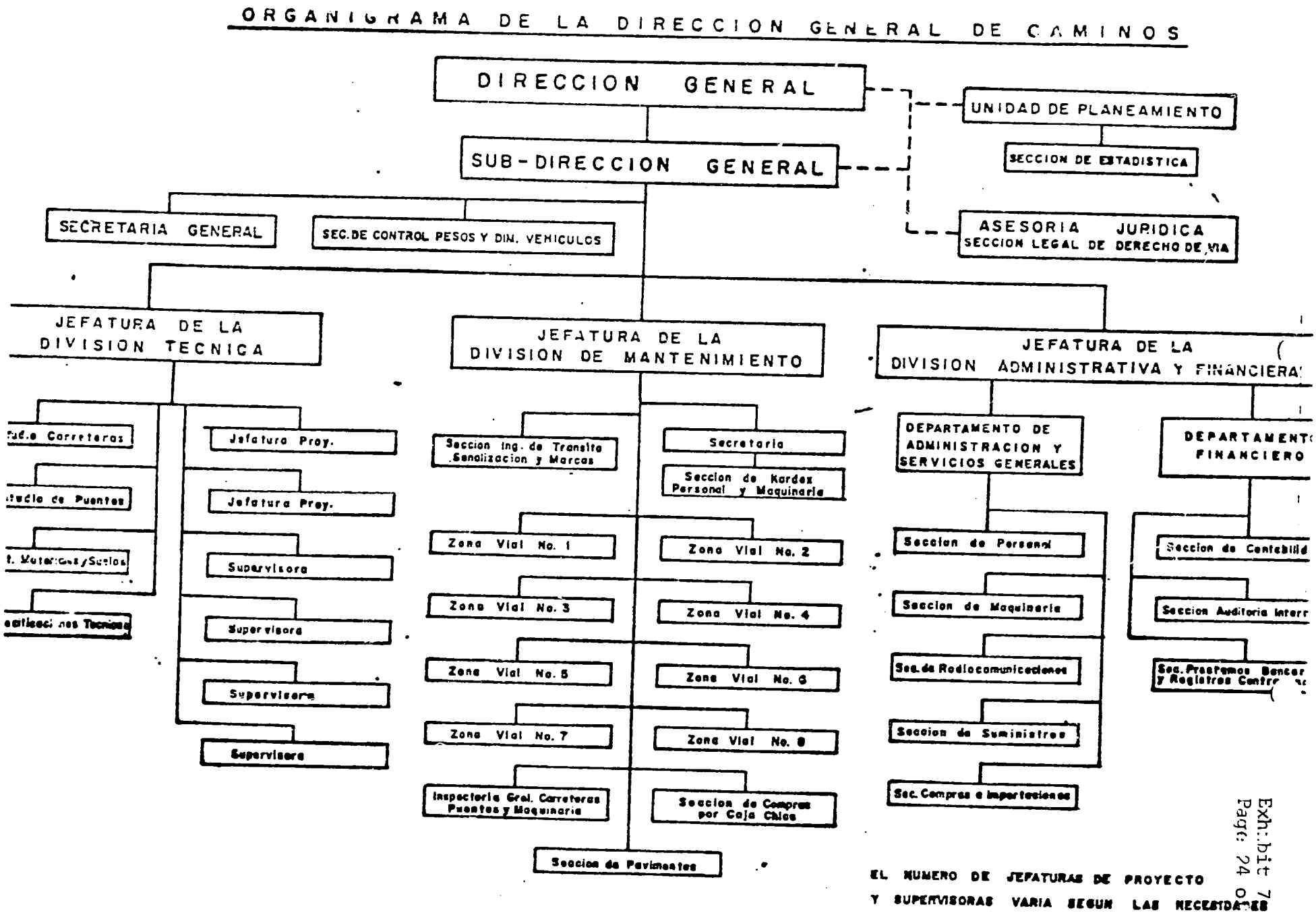

Figure 1 - Organigrama de la Dirección General de Caminos

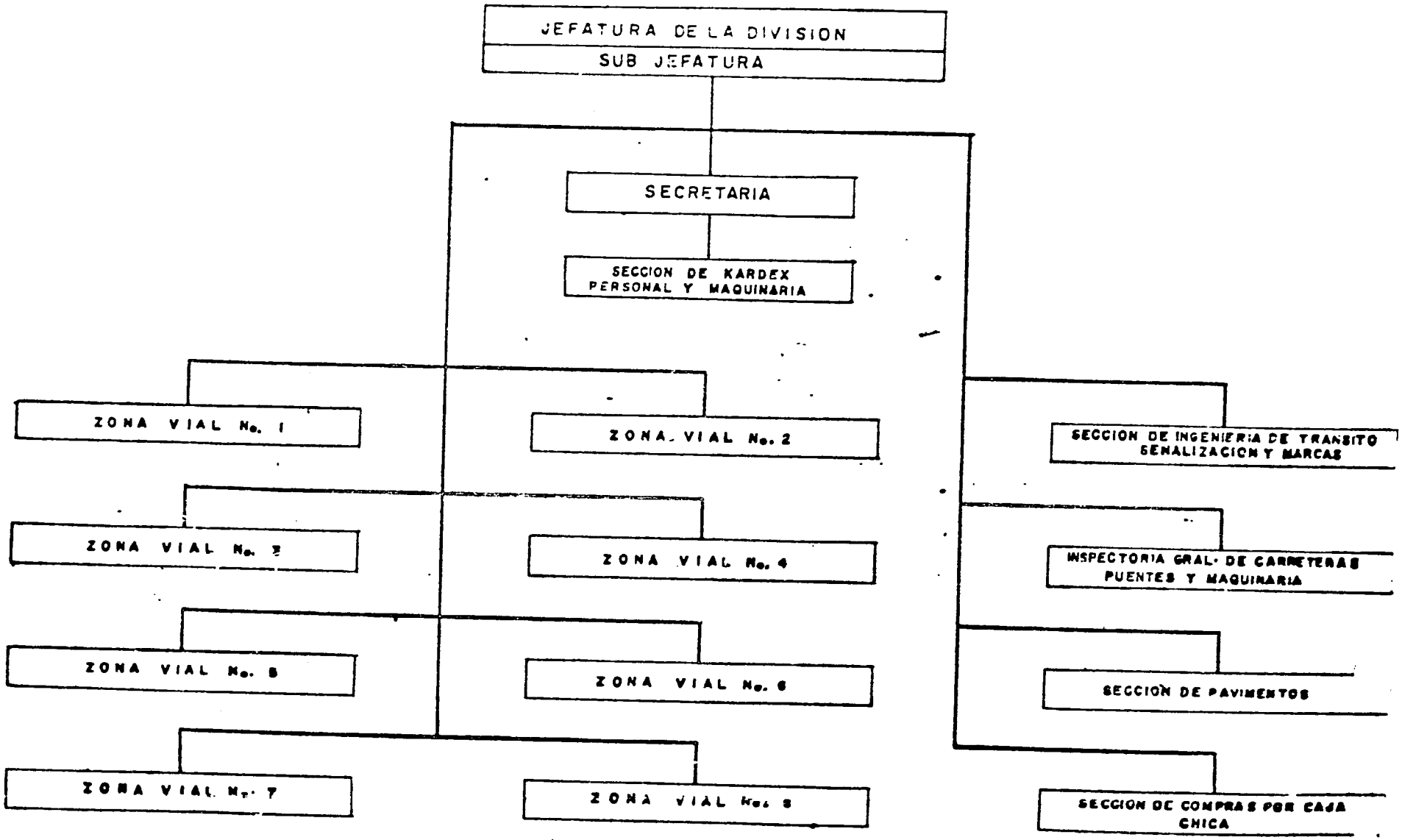

Figure 2 - Organigrama de la Division de Mantenimiento

ORGANIGRAMA DE UNA ZONA VIAL

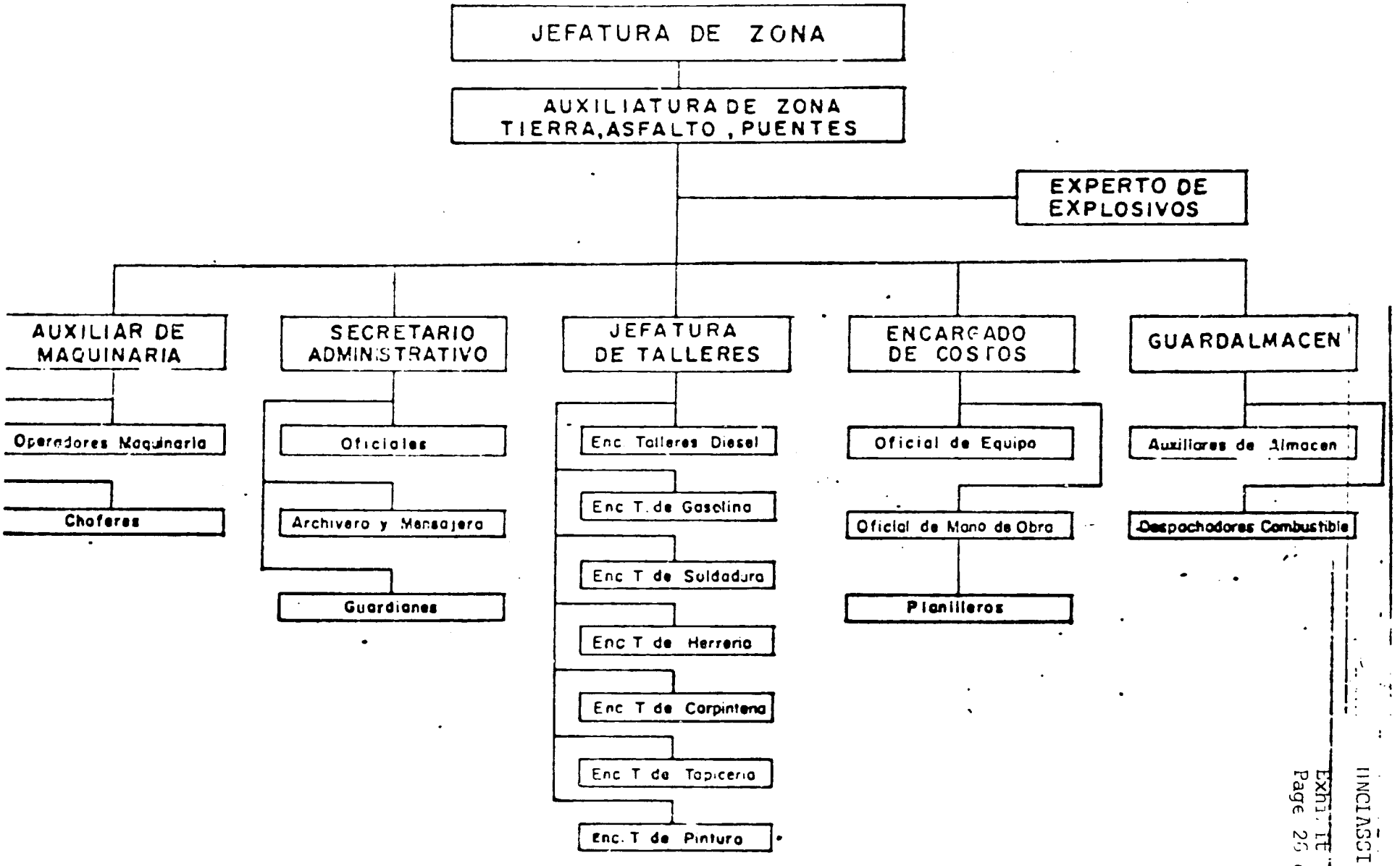

Figure 3 - Organigrama de una Zona Vial

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Page 26 of

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the Maintenance Department is more adapted to operational activities. As we shall see this has repercussions when we are to discuss the requisite organisational structure.

The Maintenance Department carries out a total of some 8,000 kms. of reparation work each year and a small amount of construction work.

The majority of the roads contained in the USAID programme are in Zones 5, 6 and 7.

4. The Access Roads Unit (ARU)

It is imperative that a unit be set up within the DGC which will be wholly responsible for access road construction. Its function would cover all aspects of the implementation of the construction programme. That is, it would not only deal with the operational activities but also with the technical, financial, administrative and organisational aspects. It should exist as a clearly defined self-contained unit. Experience has shown that where the responsibility for access roads is undelineated from that of secondary and major roads, then access road construction is given the lowest priority. There are many reasons for this. However, the establishment of a separate unit focusses attention on these roads and gives them the priority they deserve.

The Unit will have a dual role in that not only will it be supervising and controlling work carried out by direct labour, but it will also be putting certain projects out to tender. Thus it is envisaged that some 35% or 80 kms. of road will be built by private contractors over the 5-year USAID programme period.

This private contract work will probably not be initiated until after the first few labour-intensive projects have been executed by the first Access Roads Group using direct labour.

The USAID programme will be initiated in mid 1976. If this programme is to have any chance of being effectively implemented, thought must be given now to the details of the establishment of the access roads unit. It will be necessary to finalise within the next few months what are the staffing requirements of the Unit, what re-orientation is required at the headquarters. Further, if the regional arms of the ARU are to be focused on the Zona Viales what extra staff, resources and equipment are required to develop them into a viable operational group?

It is expected that the first steps will be the setting up of the ARU. The ARU in turn will establish the operational groups in the Zona Viales. One would expect that initially only one such group would be established, preferably based in the area where the first pilot projects are to be executed. The other groups would be established stage by stage over a certain period. This would mean that the results of the PREALC study programme and the lessons learned from the initial group would benefit in the setting up of the succeeding ones.

We have already established that the administrative location of the ARU should not be in the maintenance department due to this department's limited technical expertise. It is clear that the natural location would be in the construction unit of the technical division. Nevertheless it is our view that the local or regional groups which will implement the access roads programme should be located in the Zona Viales. To set up a separate unit would not only place a heavier burden on the administration but would ignore the depth of experience and practical expertise which exists in the Zona Viales. It is true however that the Zona Viales report directly to the Maintenance Department. In the preparation of the organisational structure, and in particular the communication and administrative links between the Headquarters and the regional offices, great care must be taken to ensure that there is no confusion of responsibility.

5. The Organisational Structure

In this section we present an organisational structure which could be capable of implementing the initial stages of the USAID, or any other, access road programme. In preparing this structure it was important to recognise two important and inter-related points. First, the organisation should be sufficient to initiate the programme, however it should be considered as the minimum requirement. Second, whatever organisation is proposed should be flexible, so that it could be changed in the light of the recommendations and results of the proposed PREALC study programme. The organisation which is constructed to initiate the programme may not therefore be the final structure for the overall implementation of the programme. Nevertheless, it should provide the foundation from which the final structure can be built. One further important point is that the new organisation should fit into the existing DGC structure without creating personal friction or confusion of responsibility. For this reason, although it was originally considered that the field structure of the ARG (access roads group) would be part of the Zona Viales it became clear that this would produce a conflict of responsibility which would lead to inefficiency.

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(e) Headquarters

The structure of the ARU at headquarters level is shown in figures 4 and 5.

The ARU will be a separate unit within the Technical Division reporting directly to the division chief. This will ensure that the particular problems relating to access road construction will be given separate and individual attention. Needless to say the ARU will collaborate intensely with the Design and Construction Units.

The Chief of the Unit will have the overall responsibility of the direction and co-ordination of any access roads programmes. He will therefore be responsible for the assessment, evaluation and implementation of the recommendations which arise from the PREALC study programme. He will sit on the Consultative Committee for the study programme and will work closely with the PREALC Project Manager. He will be an experienced civil engineer.

The Senior Engineer will be responsible for the planning and execution of the construction programme. In this he will work closely with the Planning Unit which will identify the roads to be constructed and the order of priority. He will also be responsible for the construction of access roads by private contractors in terms of the production of contract documents. He will be assisted by two assistant civil engineers a cost accountant, a testing clerk and an administrative clerk. The access roads group chiefs will report directly to him. He will be responsible for the cost evaluation of the work being carried out and for the smooth administration of the programme.

The Unit Administrator will be concerned with the day to day administration of the unit, he will be assisted by two clerks and two typists.

It is expected that at a future date a further group will be added to the unit which will be led by a Senior Engineer. This group will report directly to the Chief of Unit and will be concerned with the detailed analysis and evaluation of the programme. Its duties will be the analysis of data collected from the on-going projects, quality control, detailed planning and design assessment. In total it will monitor all the technical aspects of the programme. Initially this work will be carried out by the Senior Engineer (Operations) and his two assistant engineers and they will co-operate closely with the PREALC study team. As the programme grows, however, the separate technical group will be set up to carry out this work as suggested above. The group would be established as soon as it is clear that there is sufficient work load. The PREALC study team would, of course, advise on the setting up of this group.

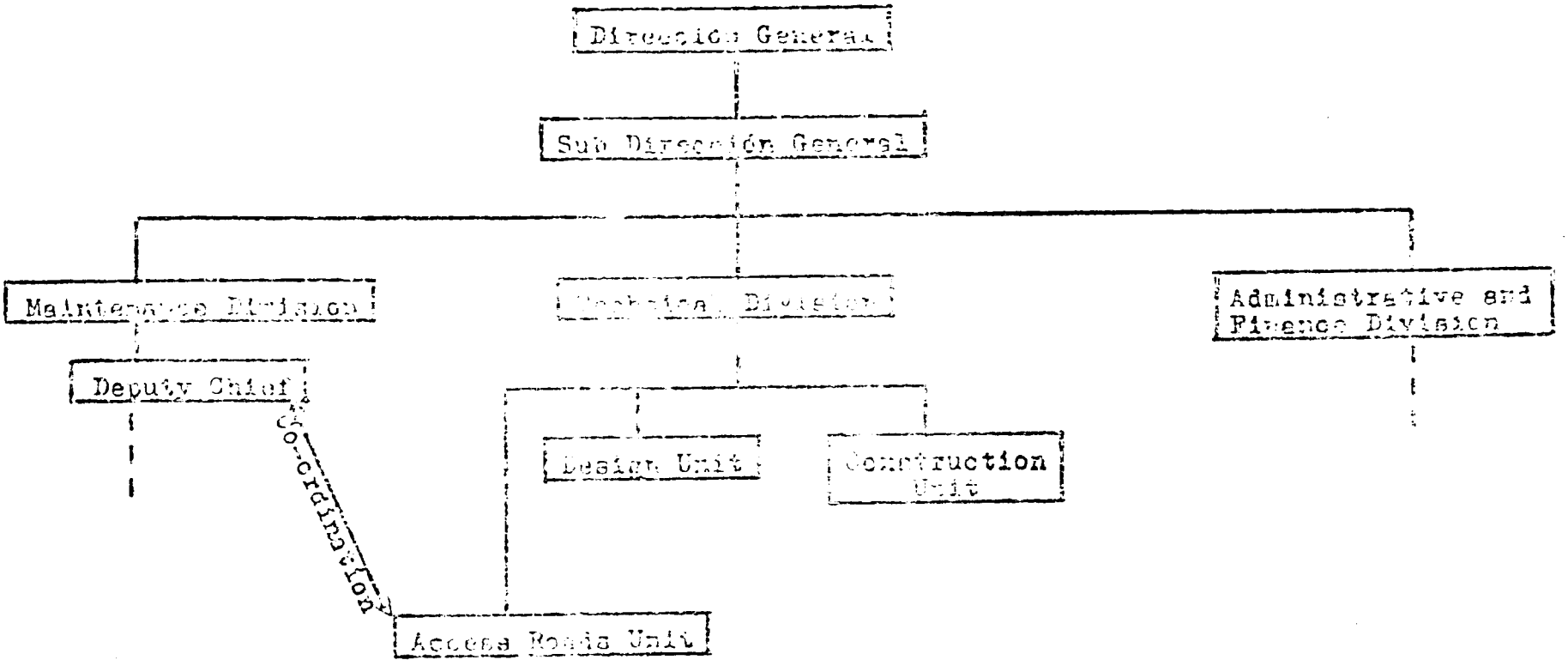

Figure 4 - Location of Access Roads Unit

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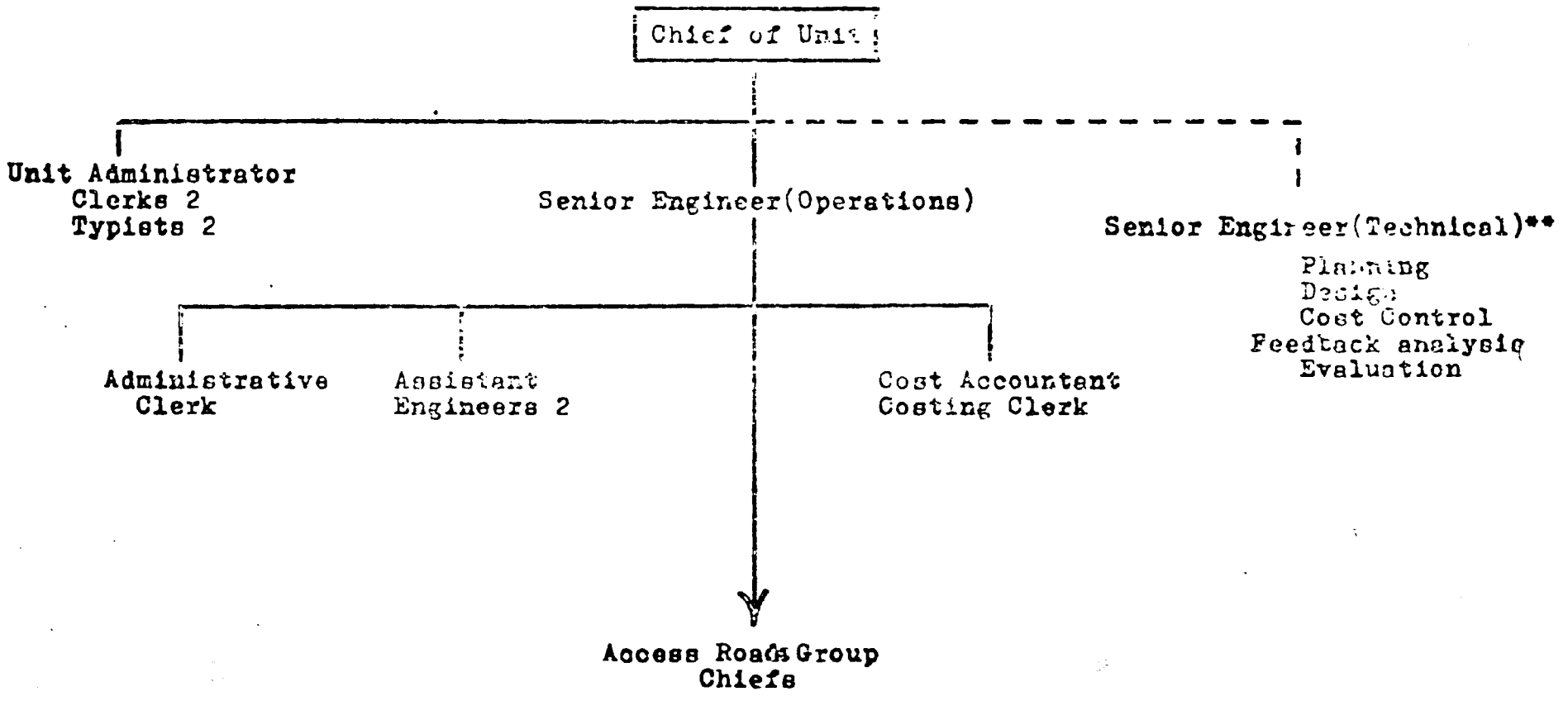

**This group will be established at a later date.

Figure 5 - Organisation of Access Roads Unit

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One further responsibility of the Chief of the Unit will be to ensure co-ordination with the maintenance department. This should be done by laying down a programme of monthly meetings with the Deputy Chief of the Maintenance Division so that the field operations of the Maintenance Division and the ARU can be co-ordinated.

(b) Regional

It is intended that the regional arms of the Access Roads Unit, the Access Roads Group, will be situated in the same locations as the Zona Viales. However, although much thought has been given to the possibility of integrating the construction and maintenance activities within the Zona Viales it was finally decided to leave the two functions separate for the following reasons.

(i) The actual physical implementation of construction and maintenance are sufficiently different that it is likely to be more effective to consider them separately.

(ii) From a practical point of view, the financing of the two operations is from different sources (i.e. government and external donors) and this creates problems of auditing if the two activities are brought together.

(iii) Because the construction programme is severely limited by time constraints, the organisation of the construction programme differs markedly from that for maintenance.

(iv) The technical expertise required is also different for the two activities.

Nonetheless it should be recognised that each Zona Vial will be responsible for the future maintenance of the access roads to be constructed. Further the construction and maintenance programmes should be co-ordinated at the Zona Vial level. It is also clear that the total expertise and knowledge of the Zona Viales will be of great value to the ARG's. Whilst the organisations for maintenance and construction have been left separate it is imperative that formal collaboration be initiated and implemented at this regional level.

The proposed structure of the Access Roads Group is shown in Figure 6.

The structure is based on an assumed output of 25-30 kms. of road per year. This is in line with the USAID programme and with a reasoned assessment of productivty. The initial Group could be located in Quezaltenango.

The Access Roads Group Chief would report directly to the Access Roads Unit at headquarters, and in particular to the Senior Engineer (Operations). He will be responsible for the detailed planning and implementation of access road construction. The roads he will be responsible for will be limited to those within the area of the Zona Vial to which the ARG is attached.

To assist him, he will have two Survey Assistants, an Administrative Officer and an Accounts Clerk. The Administrative Officer will be responsible for the day-to-day running of the ARG in terms of supplies, wages and salaries and provision of equipment. The Accounts Clerk will act as an assistant to the Administrative Officer.

The operational management of the construction programme will be directed by the Chief of the ARG who will be a qualified engineer. The supervision of the various gangs working on construction will be carried out by the Section Leader. It is considered that he would be capable of supervising 10-12 gangs; however, in the initial stages the work load is unlikely to require this number and therefore the number of gangs have been limited to eight. The Section Leader need not have formal engineering training. However, he must have a lot of experience in supervising road construction and be particularly adept at man-management. It is likely that the section leader could be chosen from the ranks of the Zona Vial.

The actual construction gangs will initially comprise of one foreman, 5 charge hands and 50 labourers. This implies five separate units within each gang. This gang organisation has been found to be effective elsewhere for rural road construction; however, it may be that the PREALC Study Programme will indicate that this is not the best-suited method for Guatemala. Nevertheless, it is felt that this is a useful starting point.

Of the construction gangs only the foreman would be permanently employed.[1] The chargehands would be chosen from the ranks of the unskilled workers and would be selected on the basis of leadership qualities rather than technical competence.

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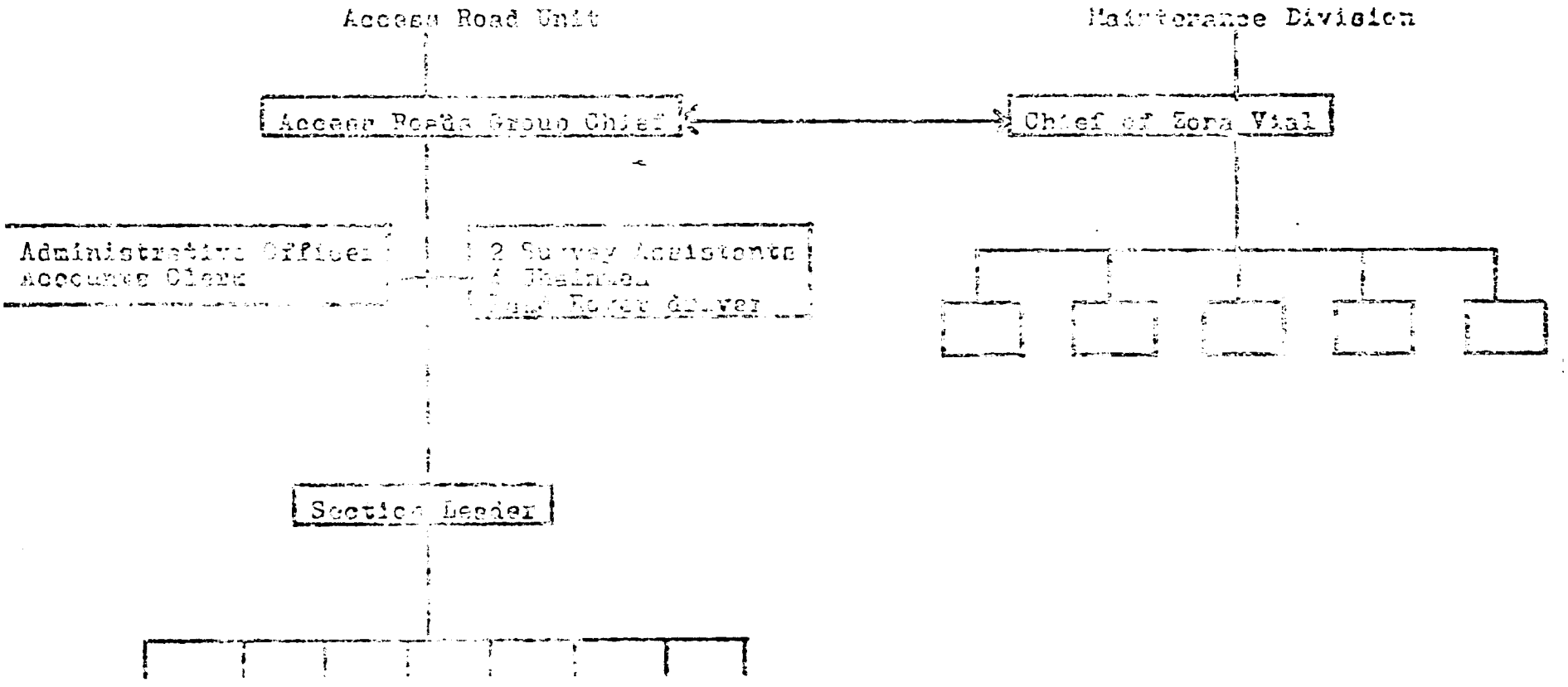
[1] If not already envisaged, it will be necessary to discuss the need for training programmes for Foremen.



8 gangs comprising

1 foreman
5 chargehands
50 labourers

Figure 6 - Organisation of Access Roads Group

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Finally, it should be made quite clear at the outset of the programme that the chief of the ARG and the Zone Vial will have to co-operate in the implementation of the programme. Meetings, at least once a month, should be formally stipulated. Not only will this ensure that the ARG runs smoothly but also that there is a constant interreaction between the two organisations for their mutual benefit.

6. Staff

We can now summarise the basic staff requirements as follows:

Access Roads Unit

Chief of Unit
Senior Engineer (Operations)
Administrative Chief
Cost Accountant
2 Assistant Engineers
4 Clerks
2 Typists

Access Roads Group

Chief of Group
Administrative Officer
Accounts Clerk
Section Leader
2 Survey Assistants
8 Foremen
1 Typist

We have not made a detailed cost evaluation of the staff budget, but it would appear that the yearly costs would be in the order of $100,000 for the Access Roads Unit and $40,000 for each Access Roads Group.

7. Further Works and Implementation

This document has attempted to provide an overall organisational framework in which an access roads programme could be implemented. There are a host of problems to which we have not addressed ourselves. These include such aspects as administrative procedures, procurement of equipment, training and recruitment of labour. We feel, however, that these are matters which should be dealt with by the PREALC study

programme and could not be adequately covered here.

Nevertheless, there are some further points in relation to the establishment of the organisational structure which are worthy of discussion at this stage. Essentially these relate to timing.

If all goes well it is hoped to commence the pilot projects for the access roads programme in March or April 1976. If this is the case the skeleton of the organisation should be in place by the end of February or beginning of March. This does not mean that the whole of the organisation should be established. However, it does imply that the Chiefs of the ARU and the ARG have been designated. Furthermore, the Chief of the ARU should be very much involved with the establishment of the organisation.

When work commences it is unlikely that all eight gangs will immediately be required. It is envisaged that there will be a phased introduction of work in various areas of the Zona Vial chosen for the siting of the first Access Roads Group. This phasing will depend largely on the extent to which the planning of the programme has proceeded. It is important therefore that within the next few months a clear idea is gained of which roads or sections of road will be the first to be constructed.

A further related aspect of the planning of construction is that it would be useful if the first few projects were not private contracts. It is anticipated that the ARU will deal with projects carried out by private contractors. However, in the initial stages it would provide one less difficulty if the Unit concentrates on the direct-labour projects.

8. Summary

We feel that this document provides a useful basis for discussion. We suggest that when all the interested parties have had time to read and evaluate the proposals, a meeting should be held to decide what action could be taken to ensure the maximum benefit of any access roads programme.

POTENTIAL BENEFIT/COSTS OF "MINI-RIEGO"

This Annex represents the Benefit/Cost analysis on selected potential irrigation projects that are to be part of the land resources development calculated by Dr. Lee Martin with the assistance of GOG personnel from DIGESA and ENAFOR and Dr. Bertis Embry of Utah State University. The basis of these estimates are reflected in the narrative of the Project Paper.

SUMMARY TABLE

6 Mini Riego Sites

Details Attached

		Disp. Income wit out irrigation Per Fam. 2 ha. Farm	Disp. Income with irrigation Per Fam. 2 ha Farm
1.	Sepelá	$628	$2,838
2.	Nahualá	628	2,867
3.	Totonicapan	628	2,660
4.	Dug well-pump Chimaltenango	464	2,354
5.	Community Lake System	628	2,586
6.	Sepelá & lined canals (Note: Slightly less than 2 ha.)	404	2,707

1. Sepelá. This is a project on the Río Sepelá, two miles north of Chichicastenango, below the diversion made above the highway bridge and the irrigated land lying below the bridge. The river is formed from the junction just upstream from the bridge of Rio Xalbaquiej and Río Xepocol. It is believed that 15 hectares can easily be irrigated with hand-dug unlined channels, including a hectare of DIGESA fruit farm, now apparently inadequately supplied with irrigation water. Aside from the fruit farm, it is assured that 14 hectares could be irrigated with a primary channel of 1 km. The flow observed in late November was approximately 600 litres/sec.; the estimated dry-season maximum was 200 litres/sec.

It is also assumed that the 14-hectare tract would be farmed by seven Indian families growing interplanted corn and beans in the rainy season and cabbage during the dry season with full irrigation.

In Baanante's terminology, the technology assumed to be intermediate, Baanante's prices were reduced to bring them more into accord with late 1975 prices. The results assumed for per hectare for interplanted corn and beans, and for cabbage are shown in the Appendix, along with similar relations for onions and potatoes.

The subproject would require approximately 60 MD to dig 1 Km. of primary canal by hand (17 meters/day), and 17 MD to dig 600 meters of secondary canal (35 meters/day). At $1/MD, this would be an investment of $75. If as much as $100 of materials and 5 MD of hand labor were required for the diversion structure itself, the total investment still would not exceed $180. The annual interest on $180 at 12% would be only $22, and no depreciation would be charged. Annual maintenance on the whole system is assumed to require 10 MD at $1 or $10 per year.

Net income on 14 hectares of interplanted corn and beans would be $1,932, on 14 hectares of cabbage $10,500. Not all

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the command area is being cropped now, but if all 14 hectares were planted to rainy-season corn and beans without supplemental irrigation, the net income is estimated at $770. The net income gain is $9,730 against an annual cost of $22.

The disposable income available to the families would be $19,964 ($4,396 from corn and beans, $15,568 from cabbage), if the families did all the farm work, and all the hand labor in constructing and maintaining the system. Even after paying for the materials in the first year, $19,864 of additional income would remain for the 7 families, or $2,838 per family, against $624 per family under the old system.*

2. Nahualá. Just west of Nahualá, at the bridge on Route 3 crosses Rio Nahualate just after attributary enters the river. With perhaps 155 cu. meters/sec., there is plenty of water to irrigate all the arable land in the immediate communal area. There appears to be no irrigation at present, with the available arable land being used for rainy season corn and beans interplanted. It is believed that 20 hectares could easily be irrigated with 20 litres/sec. of the large volume of water. This would leave an abundance of water for additional mini-riegos downstream, using the Nahualá mini-riego as a model. The project would require an estimated 1 Km. of primary channel, 600 meters of secondary channel.

It is assumed the 20 hectares would be farmed by 10 Indian families in the customary communal pattern. It is further assumed that interplanted corn and beans are grown for the family during the rainy season, potatoes for the commercial market during the dry season.

* Note: These later figures include labor income which was not included in net figures.

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It would require approximately 60 MD to dig 1 Km. of primary canal by hand (17 meters per day), and 17 MD to dig 600 meters of secondary canal (35 meters per day). At $1/MD this would be an investment of $77. If as much as $100 of materials and 5 MD of hand labor were required for the diversion structure itself, the total investment still would not exceed $182. The annual interest on $182 would be only $22, and no depreciation would be charged. Annual maintenance on the whole system is assumed to require 10 MD each $1, or $10.

Net income on 20 hectares of interplanted corn and beans with supplemental irrigation would be $2,760; 20 hectares of potatoes irrigated in the dry season, $12,040; for a total of $14,800. Under the old system of unirrigated corn and beans grown during the rainy season, net income was estimated at $1,100. The gain in annual net income is $13,700 with a net after maintenance expense of $10 or $13,690.

The disposable income available to the families would be $28,780 ($6,280 from interplanted corn and beans; $22,500 from potatoes) less an interest payment of $22 on the materials, and payment of $100 for materials, or $28,668. This would be annual disposable income per family of $2,867 compared with $628 under the old system. On both sides of the comparison, it is assumed that the ten families provide all labor per farming, and for system maintenance. (Note: Labor income is included here which accounts for difference).

3. West of Totonicapán. Beginning east of Tierra Blanca on Río Samalá and extending at least as far down as San Cristobal, there appear to be perhaps as many as 200 hectares of arable land that could be irrigated with a series of mini-riegos. The dry-season flow at Tierra Blanca appears to be about 350 litre/secs. About one-half of the arable land appears to be interplanted to corn and beans, about one half in pasture. Drainage may be required for some of the land, and rainy season flood levels would need to be investigated with respect to some tracts, while downstream water rights would need to be looked into.

There would be scope for a series of mini-riegos down Río Samalá from Tierra Blanca but what is proposed here for now is

to use only 10 litre/secs to irrigate 10 Hectares while other possibilities are investigated further. This would require approximately 1 km. of primary channel and 300 meters of secondary channel.

It is assumed that the 20 hectares would be farmed by 10 Indian families in the customary communal pattern. It is further assumed that interplanted corn and beans are grown for the family during the rainy season with supplemental irrigation; onions for the commercial market during the dry season with irrigation.

It would require approximately 60 MD to dig 1 Km. of primary canal by hand (17 meters per day), and 17 MD to dig 600 meters of secondary canal (35 meters per day). At $1/MD this would be an investment of $77. If as much as $100 of materials and 5 MD of hand labor were required for the diversion structure, the total investment would not exceed $182. Annual interest on $182 would only be $22, and no depreciation is charged. Annual maintenance on the whole system is assumed to require 10 MD of labor at $1 or $10.

Net income on 20 hectares of interplanted corn and beans with supplemental irrigation would be $2,760; 20 hectares of irrigated onions grown during the dry season would be $11,980, for a total of $14,740. Under the old system of unirrigated corn and beans grown during the rainy season, net income was estimated at $1,100. The gain in annual net income is $13,640, less $10 of maintenance expenses, or $13,630.

The disposable income available to the ten families would be $26,709 ($6,280 from interplanted corn and beans, $20,429 from onions) less interest on the materials of $13, and payment of $100 for the materials, or $26,597. This would be an annual disposable income per family of $2,660, compared to $628 under the old system. It is assumed that the ten families provide all the labor for farming, and for maintaining the irrigation system.

4. <u>Dug well with pump in Chimaltenango valley</u>

Assumptions:

1. Water supply for one hectare of land in dry season

(supplemented water in wet season).

2. Water is available at ≈ 50 meters depth.

3. Calculations will be made: (a) for a gravity irrigation system (raising water to ground level) and (b) for a sprinkler system which requires 43.4 / in^2 pressure (100 ft. of head) at the sprinkler nozzles.

4. Crops grown to be corn and beans during the wet season (shorten season with supplemental irrigation) and cabbage in the dry season.

From FAO and I&D paper No. 24 as quoted in "Irrigation Requirements and Precipitation Deficits for Guatemala" by George Hargreaves, page 72, vegetables will take from 250-600 mm of water in evapotransportation per season will use 500 mm or 0.5 meters for design purposes.

For a growing season of 120 days, water requirements will be less for the first and latter parts, so use a 100 day irrigation season or $\frac{0.5}{100}$ = 0.005 M or 0.5 cm per day necessary using an irrigation efficiency of 60% (gravity) will need $\frac{0.5}{.6}$ = 0.833 cm/day which requires approximately 1 liter/sec (liter/sec = 0.864 hectare cm in 24 hrs).

Calculations for power requirements in following pages.

Calculations for Hp. for 1 liter/sec. pump eff. 60%.
Motor efficiency 90%
Combined efficiency = 6 x 9 = .54 or 54%

50 M = 50 x 3.28 = 164'
Wt of 1 gal. water = 8.3453 #
Wt of 1 liter of water = $\frac{8.3453\ \#/gal}{3.785\ Lt/gal}$ = 2.2#/lit

L Hp = 550 ft #/sec

$$Hp = \frac{2.2\#/sec \times 164\ ft}{550\ ft\#/sec \times 0.54} = 1.22\ H.P.$$

Commercial size 1.5 HP

It would be best to put 8.33 cm on 10% of land which would mean a 10-day irrigation cycle.

If sprinkling were desired:

$$HP = \frac{2.2\ (164 + 100)}{550 \times 0.54} = 1.955 \text{ or } \underline{2\ HP}$$

Investment:

Well digging 80 MD at $1.oo	$80.oo
2 HP pump-electric motor & well pipe	300.oo
400' alum pipe at 0.50	200.oo
3 sprinklers at $12 (low)	36.oo
2" T	150.oo
Dead End	5.oo
	$636.oo

Av. annual Int. on ($636-80) = 556 at 12% =	33.36
Depreciation on pump and equip. 10 yr. =	56.oo
Loan repayment on 5-year plan	111.oo
Maintenance cost $10/year	10.oo
Energy cost 1500 watts x 24 hrs. = 36 Kw/day 36 kw x 100 days = 3600 kwh at 3 ¢	108.oo
Approximate total annual cost to farmers =	318.oo

Income corn and beans with irrigation =	314/ha.
Without irrigation	231
Gain	$83/ha.

Income from cabbage	750/ha.
Income to farmer	833
Less annual cost	-318
	$515
	-231
or a net gain of for 5 years	$284 per year

For next 5 years assuming pump was worn out then (which it

should not be) his annual income would be 515 or 833

Pump payment	+111	-207
	$626	$626
	-231	
or a gain of	$395	

His average gain/year = 395
284
2 /679
340/year

which gives him an average cost-benefit ratio of

$$\frac{340}{(318 + 201)/2} = \frac{340}{262} = 1.3$$

but his averg. annual income from the farm has gone from $231 to $\frac{(515 + 626)}{2} + 231 = \$800$

With, of course, double the family work because of raising two crops.

(Note: With a gravity system the investment cost would be $300 less so there would be more available for family.)

Adding in the labor income, it is assumed the family provides

for cabbage labor income	$329.50
for corn and beans labor income	125.00
Total labor income	454.50
Aver. Annual Income	800
Family income for year	1,254.50
add to this animal power	25.00
(not used) Mechanical power	36.00
+ land rentals: corn, beans	37.50
Cabbage	42.00
Makes a dollar income per family	$1,395.00

Against: 55 net income
for corn & beans 38 land rent
125 labor
$218

Net gain in disposable income after all investment costs are paid:

	$1,395.oo
	- 218
	$1,177

or $\frac{1177}{218}$ = 5.34 or 534% gain in disposable income per family double above for 2 Ha. farm.

5. Community Irrigation System Pumping out of Lake. This is an idealized project, intended to be applicable to any part of the Lake Atitlán Coastal Plain where 50 hectares of arable land can be located. Required would be a 50 HP Diesel engine, and a 900-gallon per minute pump that would pump 150 feet of head. The final requirement would be the pipe system. It is assumed the pump would operate 24 hours a day during the dry-season cropping.

It is assumed that only interplanted corn and beans would be grown during the rainy season, while cabbage for market would be grown under irrigation as the dry-season crop.

Investment

50 HP (PTO rated) engine, installed	$6,000
900 gal/min pump (65 #/in^2)	850
(150 ft. 1 ft. friction and-pressure head)	
Pipe system and sprinklers	18,750
	$25,600

Operating costs are assumed to 5 gallons of Diesel fuel per hour at $0.50/gal, or $2.50/hr. Per day this is $60, and fuel for 135 days would be $8,100 for a year's pumping, 120 days during the dry season and approximately 15 days during the rainy season.

From society's viewpoint, the net income from 50 hectares of interplanted corn and beans would be $6,900 and from 50 hectares of cabbage $37,550, or a total of $44,450. From this

would need to be substracted the $8,100 for the fuel, leaving $36,350.

The annual investment costs would be $4,096 ($1,536 interest, $2,560 depreciation). It is easy to see that an annual loan repayment of $5,120 (5-year amortization) would easily be available to the community.

If the Indian Community consisted of 25 families, and these families provided all the labor, including cropping, installation of pipe and sprinkler system (presumably under the supervision of the seller), and maintenance of the irrigation system, then the income available to whole community would be $69,764 ($15,700 from corn and beans, $55,600 from cabbage less $1,536 in interest).

After the loan repayment of $5,120, the disposable income would be $64,644 or $2,586 per family compared with $628 per family under the single-crop system of corn and beans. The M/D per family would go up from 250 for the single crop system to 910 + annual system maintenance costs under the new system.

6. Lining Sepelá Primary Channels with Tile. This is an idealized project to illustrate the use of tile to reduce water losses in the system. The B/C ratio on the original Sepeñá project was so favorable that we can assume that all the water reaching the farmers' lands will be used up in a very few years.

The assumption is that the water reaching the land would be increased by 50 percent by lining the existing primary canal with clay tile and digging and lining another 400 meters of primary canal, and digging another 250 meters of secondary canal.

The investment would be as follows:

Digging 400 meters of primary canal, 24 MD at $1 ea.	$24
Digging 250 meters of secondary canal, 7 MD at $1 ea.	7
Tile of the appropriate size, 1400 meters 6" pipe 4,550 ft. at .80/ft.	$3,640
Installing 1400 meters of tile, MD at $1 each. 29 MD	29
	$3,700

This would be the total investment for the additional 7 irrigated hectares. Annual interest at 12% would be 444, depreciation on the tile would be $200/yr. If the loan for the tile were repaid over a five-year period, the annual loan repayment would be approximately $1,200. Annual maintenance on the additional segment of the system is estimated at 10 MD at $1 each: $10.

Net income from 7 hectares of interplanted corn and beans with supplemental irrigation would be $966, $5,250 from the 7 hectares of cabbage, for a total of $6,216. This compares with $385 for old-system corn and beans.

Disposable income would be $2,198 from interplanted corn and beans plus $9,982 from cabbage minus 450 of interest and a loan repayment of 900 for a total of 10,830, or 2,707 per family if 4 farm families cultivate the 7 hectares. This assumes that the four families provide all the labor for farming, for extending the system, and for maintenance of the extension of the system. This compares with a disposable income of $404 per family under the old farming system.

ESTIMATED COST OF PRODUCTION, INCOME AND RETURNS BY HECTARE

POTATOES

	Quantity	Unitary Value	Total Value
Seeds:			
Ordinary	28 cwt.	15.00	420.00 a)
Fertilizer:			
Complete b)	11.4cwt.	13.85	157.90
Nitrogenous	2.8 cwt.	17.50	49.00
Pesticides:			
Pest Control	73 cwt.	1.46	102.20
Soil Desinfectant	1.4 cwt.	22.00	30.80
Packaging and Freight	430 cwt.	0.40	174.00
Unforeseen Expenses (10%)			93.20
SUBTOTAL			1,025.10
Labor	413MD	1.00	413.00
Interest (12%)			59.70
Land Rental Value			50.00
SUB-TOTAL			522.70
TOTAL COST			1,547.80
Value Production	430 cwt.	5.00	2,150.00
NET INCOME			602.20

a) Variety: Atzimba o Tikal

b) Formula 15-15-15 or 12-24-12

Source: Baanante, 1975

UNCLASSIFIED

COST OF PRODUCTION, INCOME AND RETURNS BY HECTARE FOR THREE LEVELS OF TECHNOLOGY IN THE HIGHLANDS, INTERPLANTED CORN AND BEANS

	INTERMEDIATE		
	Qty.	Unit Value	Total Value
Seeds:			
Improved: H-3 Hybrid Corn	35 lbs.	0.30	10.50
Chichicaste Beans	70 lbs.	0.30	21.00
Fertilizers:			
Complete 15-15-15	3 cwt.	13.85	41.55
Urea	1.5 cwt.	17.50	26.25
Pesticides:			
Dipterex, granulated, 2.5%	3.5 lbs.	0.25	0.90
Lebaycid	0.7 lts.	8.50	56.95
Volaton, granulated, 2.5%	30 lbs.	0.22	6.60
Energy:			
Animal			25.00
Mechanical (Tractor)			36.00
Other:			
Packaging			5.00
Freight			12.00
Unforeseen expenses (10%)			15.47
SUB-TOTAL			170.22
Labor	125MD	1.00	125.00
Interest, 8%, 6 months			13.20
Land Rental Value			37.50
SUB-TOTAL			175.55
TOTAL COST			345.97
Value of Production: Corn	35 cwt.	7.00	245.00
Beans	8 cwt.	19.00	152.00
TOTAL			397.00
NET INCOME			55.[illegible]

UNCLASSIFIED

ESTIMATE COST OF PRODUCTION, INCOME AND RETURN BY HECTARE

ONIONS

	Quantity	Unit Value	Total Value
Seeds (Improved)	5 lbs.	6.00	30.00
Fertilizer			
Complete	10 cwt.	13.85	138.50
Pesticides			
Pest Control a)			34.00
Soil Desinfectant	150 lbs.	0.22	33.00
Packaging and Freight	420 sacks.	0.50	210.00
Unforeseen Expenses (10%)			44.55
SUB-TOTAL			490.05
Labor	331MD	1.00	331.00
Interest (12%)			41.31
Land Rental Value			50.00
			422.31
TOTAL COST			912.86
Value of Production	126 cwt.	12.00	1,512.00
NET INCOME			599.14

Source: Baanante, 1975

UNCLASSIFIED

ESTIMATE COST OF PRODUCTION, INCOME AND RETURNS BY HECTARE

CABBAGE

	Quantity	Unit Value	Total Value
Seeds:			
Improved	2 lbs.	4.00	8.00
Fertilizer:			
Complete	9 cwt.	15.00	135.00
Nitrogenous	3 cwt.	17.50	52.50
Pesticides:			
Pest Control	9 lts.	5.50	49.50 a)
Soil Desinfectant	63 lbs.	0.22	16.86 b)
Energy:			
Packaging and Freight	840 sacks	0.25	210.00
Unforeseen expenses (10%)			46.88
SUB-TOTAL			515.74
Labor	329.5MD	1.00	329.50
Interest (12%)			42.81
Land Rental Value			42.00
SUB-TOTAL			372.31
TOTAL COST			930.78
Value of Production	840 sacks	2.00	1,680.00 c)
NET INCOME			749.22

a) Folidol
b) Volaton
c) Approximately 30 lbs. in each sack
Source: Baanante, 1975

UNCLASSIFIED

SUMMARY LOGFRAME - SMALL FARMER DEVELOPMENT

520-L-026

Page 1

Goal:	Measures of Goal Achievement:	Means of Verification:	Purpose to Goal Assumptions:
Improve the quality of life and increase the incomes of rural Guatemalans.	1. Increased agricultural productivity. 2. Increased employment opportunities. (NOTE: Measures of goal achievement specifically attributable to the project are not quantifiable at this level of generalization.)	Future Agriculture Sector Assessments.	Increased amounts of agricultural goods being marketed will not cause a lowering of prices to the extent causing a drop in small farmer income.
Purpose: 1. Increase the productive capacity of small farmer land resources. 2. Open new lands for settlement by small farmers and landless poor. 3. Expand the farm-to-market transportation infrastructure. 4. Strengthen the capacity of public agricultural sector organizations to carry out planning, programming and delivery of improved services and technical assistance to small farmers.	End of Project Status: NOTE: For End of Project Status, Means of Verification, and detail below this level see the sub-elements of this logical framework covering components of the project, which follow. Purposes are restated and somewhat expanded to facilitate understanding of the causal links between outputs and purpose.		

LAND SETTLEMENT

A-1

PURPOSE	END OF PROJECT STATUS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
1. To open new lands for settlement by mall farmers and landless poor.	1. Approximately 50,000 hectares of land divided into family size farms with connecting road access, basic social and coop infrastructure in place and settled by some 5,000 farm families from the poorest areas of the country.	1. GOG and coop reporting. 2. Periodic evaluations by GOG and USAID 3. Coop borrowing and lending records.	
2. Develop within the GOG and coop institutions the capacity to engage in a continuing program of resettlement of underprivileged rural families to frontier areas at low costs.	2. a. System for transfer of large blocks of land from the public domain to coop institutions established. b. GOG and coop organization personnel experience in all facets of land settlement operations. c. Land use studies and cadaster completed on 2,900 sq. Kms. on which settlement is continuing.		
OUTPUTS	**MAGNITUDE OF OUTPUTS**		
1. Access	1. 12 Kms. of road constructed providing access to and within the area.	1. Cooperative records on settlers, erection of infrastructure and cash flows. 2. Sector planning unit evaluations.	1. Farmers in the highlands are willing to move to new area. 2. Sufficient labor can be generated in the new settlement area to sustain families first crop is harvested.
2. Social infrastructure	2. 25 school buildings, 5 health posts, 5 community centers and 5 airfields constructed and in use.		
3. Coop organized and functioning in land settlement area.	3. 5 coops with about 1,000 members each providing credit, farm supply and marketing services.		
4. Contract operational between GOG and coops.	4. Contracts executed and operational.		
5. Coop recruitment and transportation of highland families.	5. 5,000 families selected, given orientation and moved to the new lands.		

INPUTS	MAGNITUDE OF INPUTS		
USG 1. Grant a. TA (long term advisory assistance) b. TA short-term advisory assistance 2. Loan a. Coop Infrastructure and services. b. Production and medium term credit. c. Secondary roads and social infrastructure. d. Cadaster and land use studies.	USG 1. Grant a. 2 long-term advisors - Coop Management and land settlement planner (6 man-years - $330,000) b. Short term assistance. 2. Loan a. Funds loaned to coop for staff salaries and operating costs ($230,000); housing, buildings, warehouses and field facilities ($350,000; surveying and delineating farm and urban boundaries ($125,000); vehicles, marketing equip., sawmills, generators, communications equip. ($435,000); selection and transportation of settlers ($200,000); working capital for five cooperatives ($250,000). b. Credit for 5,000 farm families for crop and livestock production - $2,000,000. c. 48 Kms. of secondary road ($720,000); school, health, community buildings and STOL airfields ($190,000). d. Resource studies and cadaster survey	1. Project monitoring. 2. Provide evaluation. 3. TA contract reports. 4. GOG and coop reports and financial statements.	1. GOG will take the decisions required to use the cooperatives as an instrument for land settlement and provide grant and loan support to the cooperatives for land settlement purposes. 2. The GOG will sell the land to cooperatives at a symbolic price for distribution to farmers by the cooperatives.

ROADS

Purpose:	End of Project Status:	Means of Verification:	Purpose to Goal Assumptions:
1. Improve access (in general and in particular to markets) for isolated small farmers.	1. Vehicular traffic during the peak season for marketing of agricultural products will on average exceed 25 per day on tertiary and 7 per day on farm-to-market roads constructed, up-graded and maintained.	1. GOG traffic surveys and vehicle counts and USAID spot checks.	
2. Employment generation for rural poor.	2.a. 3,800 man-years of employment generated during life-of-project. b. GOG plans nad has budgeted to continue labor intensive road construction and maintenance at a rate which will generate not less than 900 man-years of employment per year.	2. Highway Department Progress Reports, Consulting Engineer Reports and Project Monitoring Reports.	
3. Expand the capacity of the Highway Department to undertake labor intensive road construction and maintenance on a continuing basis.	3. Two years after the end of the project. They will be constructing tertiary and farm-to-market roads at a rate of not less than 85 Kms. per year and all roads constructed will be being maintained.	3. Highway Department Progress Reports, Consulting Engineer Reports and Project Monitoring Reports.	
Outputs:	**Magnitude of Outputs:**	**Means of Verification:**	**Outputs to Purpose Assumptions:**

Inputs	Magnitude of Inputs	Means of Verification	Input to Output Assu
US (All Loan-Funded)			
1. Equipment	1. Road Construction Equipment, tools and spare parts for total $2,200,000.	AID Inputs - Project monitoring and monthly progress reports.	[redacted]
2. Supervision	2. Twelve man-years of consulting engineers for total $330,000.		
3. Contractors	3. Contracted Road Construction, $2,000,000.		
4. Miscellaneous materials	4. Road construction materials, $370,000.		
GOG			
1. Engineering	1. Engineering for road construction survey and design, $150,000.	GOG Inputs -	
2. Administration	2. Project administration and supervision, $260,000.	- GOG Budgets - Project Monitoring - Consulting Engineering Reports	
3. Labor	3. Skilled and unskilled road construction workers, $1,048,000.	- Ministry of Finance Annual Analysis of Actual versys Budgeted Expenditures	
4. Miscellaneous materials and supplies	4. Construction materials and supplies, $562,000.		
5. Local currency support for UNDP technical assistance.	5. $20,000 in local currency support		
UNDP (BID-Funded)			
Technical assistance	Seventeen (17) m.m. of short-term technical assistance for Department of Highways on labor intensive road construction for total $100,000.		

Purpose: 1. Improve water and land use in the project area (DIGESA Region I) 2. Establish within DIGESA the capability to effectively implement small irrigation and soil conservation projects.	End-of-Project Status 1. a. 5,000 hectares newly irrigated b. 5,000 hectares newly utilizing soil conservation structures. 2. a. GOG plans and has budgeted to continue these activities at least at the rate achieved by end-of-project. b. Two years after the end of the project 2. a. will still be true and the GOG will be expanding these activities to other DIGESA regions.	Means of Verification: Project monitoring and evaluation, DIGESA reports and budget, and TA Advisor reports.	Purpose to Goal Assumptions:
Outputs: 1. Mini riego teams, trained, equipped and experienced. 2. Soil conservation teams, trained, equipped and experienced. 3. Fully staffed Regional Project (support) Office.	Magnitude of Outputs: 1. 2 teams of 1 Agronomist, 1 engineer, and 1 topographer, trained on the job by Irrigation Engineer TA Advisor, fully equipped and experienced in small irrigation projects through work in this program. 2. 4 teams of 1 agronomist, 1 engineer, and 1 topographer or hydrologist, trained on-the-job by Soil Conservation Expert TA advisor, fully equipped, and experienced in small soil conservation projects through work in this program. 3. 3 secretaries and 3 messenger/office assistants to support teams.	Means of Verification DIGESA reports and budget, TA advisor reports and project monitoring.	Outputs to Purpose Assumptions: -- That DIGESA will be able to retain the personnel who were trained and gained experience under the project. -- That future budgetary constraints will not prevent continuation of activities after AID funding terminates.

4. Loan	4. Revolving fund established in Bandesa to provide intermediate credit for mini-riego activities.		
5. DIGESA social payment	5. System established for making social payments to those employing soil conservation practices.		
Inputs: USG 1. Grant a. TA (Advisors, trainint)	Magnitude of Inputs USG 1. Grant a. Two TA Advisors, one for soil conservation team and one for 2 mini-riego teams 72 mm., total $300,000, plus 6 mm short term consultants, total $30,000.	Means of Verification: AID Inputs - Project monitoring and monthly progress reports.	Input to Output Assumptions -- That personnel of suitable quality can be recruited by AID for the TA positions and by the GOG for the Regional Project Office Staff and the Mini-Riego and Soil Conservation teams.
b. Equipment and Supplies	b. Technical equipment and supplies for teams, total $13,000.		-- That natural disasters (e.g., floods, earthquakes, volcanic eruptions) in the project area will not significantly hinder or prevent project implementation.
2. Loan a. Vehicles	2. Loan a. 8 pick-up or equivalent teams, total $48,000.	GOG Inputs - - GOG Budgets - Project Monitoring - Technical Advisors Reports - Ministry of Finance Annual analysis of Actual versus Budgeted Expenditures	
b. Money for Loan Fund (Revolving)	b. $500,000 for Revolving Fund for intermediate credit for mini-riego activities.		
c. Funds for Social Payments	c. $125,000 for Social payments for those employing soil conservation practices.		
d. Some salaries for design team	d. Salaries for mini-riego & soil conservation teams (75%, 1st. year; 50% 2nd. yr; 25%, 3rd. yr) for total $31,000. [illegible] support costs & operating expenses - $42,000 over 3 years.		

GOG: 1. Salaries for mini-riego & soil conservation teams. 2. Support Staff 3. Local Support Costs and Operating Expenses. 4. Equipment and supplies. 5. Social payment for those employing soil conservation practices.	GOG: 1. Salaries for mini-riego & soil conservation teams (25% 1st. yer; 50% 2nd year; 75% 3rd year; 100% 4th and 5th years) for total $189,000. 2. Salaries for regional project office staff (6 people for 5 years at $18,000 per year) for total of $90,000. 3. Local support costs & operating expenses - $98,000 over 5 years. 4. Technical equipment and supplies for teams, $18,000. 5. Social payments for those employing soil conservation practices, $125,000.		

Purpose:	End of Project Status:	Means of Verification:	Assumptions:
Strengthening the capacity of public agricultural sector organizations to carry out planning, programming, and delivery of improved services and technical assistance to small farmers.	1. Planning, programming/budgeting, and evaluations by SPCO divisions will be clearly superior to previous MOA efforts in objectively describable ways. They will be demonstrably important to and useful in ag public sector decision-making processes. 2. The data base will be farm more comprehensive and appropriate, as a result of Information and Data Division activity. This will be evident from the frequent and effective use of this data in the activities described above in 1. 3. Training will considerably enhance the effectiveness of ag public sector employees as evidenced by: a. Income of the client group for GOG ag technical assistance will increase on average at a rate at least 50% higher than that of the small farmer populations as a whole. b. The client group reaction to the services provided will be more favorable in year 5 of the project than year 1 by at least 15%. c. Small farmers participating in GOG ag technical assistance programs will increase by at least 30%.	1. USAID evaluations 2. Regular USAID analysis of SPCO planning, programming/budgeting and evaluation documents. 3. USAID evaluations (including surveys of income and attitudes).	

Outputs:	Magnitude of Outputs:	Means of Verification:	Output to Purpose Assumptions:
1. An expanded Sector Planning and Coordination Office within the Ministry of Agriculture.	1. Within the office, the following divisions, staffed and with responsibilities as agreed to between USAID and the GOG, will be formed. Economic analysis and Multi-Year Planning, Programming, Budgeting, and Project Development; Information and Data; Evaluation; and Training Coordination.	GOG Agriculture Sector reports and budgets and USAID project monitoring.	- Agriculture sector institutions will be able to retain personnel recruited for new positions and/or trained under the project. - Political considerations and bureaucratic jurisdictional disputes will not prevent the SPCO from effectively assuming its expanded duties. - Budgetary constraints will not force cutbacks in training programs.
2. An integrated, sector-wide pre- and in-service training program.	2. In-service training will be provided annually in the following areas: ag technology for field agents (1,684 man weeks); management training for supervisors (788 m.w.); specialized training in credit operations, storage and marketing, ag research techniques, etc. for appropriate personnel (827 m.w.); sector and institutional orientation (1,000 m.w.) and pre-service orientation (300 m.w.).		
3. Personnel of agriculture sector institutions trained in the U.S. and 3rd. countries.	3.56 man years of training in specialized fields where public sector competence is non-existent or in critical short supply will be provided as described in Section II. D.		

Inputs:	Magnitude of Inputs:	Means of Verification:	Input to Output Assumptions:
USG 1. Grant a. TA (long term advisory assistance b. TA - short-term advisory service 2. Loan a. Personnel costs salaries 2. Operating costs 3. Equipment, supplies and services 4. Contract services 5. Transportation and Per Diem 6. Training center operation.	USG 1. Grant a. 4 long-term advisors - Ag Econ, Reg. Planner, Prog./Budget, In-Serv. Trg. (12 M. Yrs. $525,000) b. Short-term assistance in economic analysis data collection, processing and evaluation techniques (5 man years, 300,000) 2. Loan a. Sector planning and coord. office (SPCD) (22 man years 2. SPCO ($265,000); Trg. Coord. ($217,200) 3. Trg. Coord. ($106,000) 4. SPCO - computer time ($55,000) eval. contracts ($150,000) Trg. Coord: contract instructional services. ($75,000) 5. Trg. Coord in-country p. diem ($171,000) scholarship trg. int'l. trans. & Trg. subsidy ($100,000) 6. Amatitlán trg. center operating costs ($350,000)	- Project monitoring - Periodic evaluation - Monthly reports from TA contractors - Ag public sector institutions monthly and quarterly reports and budgets.	1. That personnel of suitable quality can be recruited by AID for the TA positions and by the GOG for the SPCO and Trg. Coord. elements of the project. 2. That suitable candidates for participants can be recruited on a timely basis. 3. Political considerations will not inhibit the formation of the SPCO .

PARTICIPANT TRAINING PROGRAM UNDER LOAN 520-L-018

Background and Procedures

Under Loan No. 520-L-018, forty four participants were trained at a cost of $373,548 through September 30, 1975. Thirty-one of these were trained in the U. S. and twenty-one participants attended formal academic programs.

A Presidential Decree signed on July 25, 1972 established the basis for the operation of the training program under this Loan. In accordance with the decree, a Scholarship Committee was appointed. This is composed of the Director General of DIGESA, who is the Chairman; the Director of DECA, who is the Executive Director; and three appointed members from INDECA, BANDESA and ICTA. Minutes of meetings are kept by a Secretary who is a regular employee of DECA and whose position is Coordinator of the Scholarship Project.

The Scholarship Committee is responsible for 1) reviewing the Annual Scholarship Plan and 2) Selecting participants proposed by various agencies of the Public Agricultural Sector.

Selection is made according to the following criteria:

1. Programs may be short or long term. The latter encompass postgraduate training. Undergraduate training is only authorized when the particular field of specialization is not available in Guatemala.

2. Loan funds under this line item cannot be utilized for seminars, congresses, symposia or meetings of less than thirty days.

3. Priority is given to training programs in research, education, administration, economics, agricultural engineering and natural renewable resources.

4. The Annual Training Plan is prepared in accordance with priorities of the Public Agricultural Sector. Suitable candidates are nominated by the various agencies.

A copy of the Committee's resolution accepting a candidate is submitted to USAID Training Office. This

specifies the name of candidate, his organization, field of specialization and suggests the university where training could be conducted.

Funding for these programs is provided through a Direct Reimbursement Authorization that AID/W issues to USAID Controller's Office for a lump sum.

The Training Office is responsible for 1) obtaining from the candidate biographical data and transcript of records and 2) processing PIO/P's and related documentation per HB 10. PIO/P's are approved within USAID/G and forwarded to the Minister of Agriculture for final authorization. Academic placement is arranged through AID/W (for U. S. training) or USAID Missions (for third country programs). AID/W or USAID Missions submit academic records which are forwarded to DECA. PIO/P's are issued for a maxim period of twelve months. Extensions are prepared per recommendation received from a university advisor and/or AID/W or USAID. Should the participant's performance be unsatisfactory, the Scholarship Committee has the authority to request that the program be cancelled.

International transportation is covered by a special account (trust fund) which the Government of Guatemala includes in the National Budget every year.

PARTICIPANT TRAINING UNDER LOAN 520-L-018

No. Part.	PIO/P	Title	Level/ Type	Employer	From	To	M/M	Country	DPA	Amount
1	520-204-1-20009	Plant Pathology	B. S.	ICTA	9-30-68	2-5-73	17*	Mexico	520-L-01802	6,278
1	520-204-1-20011	Plant Pathology	B. S.	ICTA	8-31-70	8-18-74	36*	Mexico	520-L-01802	13,275
1	520-204-1-20012	Animal Husbandry	B. S.	Vet. School	8-31-70	8-18-74	36*	Mexico	520-L-01802	13,206
1	520-204-1-20013	Animal Husbandry	B. S.	Comm. Dev.	8-22-69	6-28-73	22*	Mexico	520-L-01802	8,525
1	520-204-1-20014	Animal Husbandry	B. S.	Dir. Agr. Dev.	8-27-69	10-13-73	25*	Mexico	520-L-01802	11,050
1	520-204-1-20015	Animal Husbandry	B. S.	Comm. Dev.	8-25-69	8-2-73	23*	Mexico	520-L-01802	8,599
1	520-204-1-20018	Plant Pest Control	B. S.	Experimental Station	1-12-71	1-10-73	12*	U. S.	520-L-018005	6,600
1	520-204-1-20019	Animal Science	M. S.	ICTA	1-2-71	11-7-72	11*	U. S.	520-L-018004	6,600
1	520-204-1-20020	Plant Pathology	B. S.	Comm. Dev.	2-2-69	3-7-73	13*	Mexico	520-L-01802	4,601
1	520-204-1-20072	Tropical Soils	Sp.	ICTA	7-8-72	8-4-72	1	U. S.	No info.	300
1	520-204-1-30006	Plant Pathology	M. S.**	ICTA	8-4-72	11-30-73	16	Mexico	520-L-01802	14,194
1	520-204-1-30007	Irrigation	M. S.	Water Resources	8-4-72	7-20-74	24	Mexico	520-L-01802	14,194
1	520-204-1-30009	Soil Science	Ph.D.	Dir. Agr. Dev.	8-24-72	5-76	45	U. S.	520-L-01814	29,133
1	520-204-1-30010	Irrigation Engr.	M. S.	Water Resources	9-1-72	4-19-75	32	U. S.	520-L-01814	24,400
1	520-204-1-30019	Agricultural Economics	M. S.	ICTA	9-26-72	6-14-75	44	Colombia	520-L-01802	10,320
1	520-204-1-30023	First U. S. Advanced Seminar in Participant Training	Sp.	DECA	10-4-72	11-18-72	1½	U. S.	520-L-01802	1,700
1	520-204-1-30039	Agricultural Produce Preservation	M. A.	INDECA	1-7-73	8-26-74	19	U. S.	520-L-01814	18,500
1	520-204-1-30064	Agricultural Information	M. S.	DECA	1-18-74	3-31-76	27	Mexico	520-L-01802	16,050
15	520-204-1-30068	Agricultural Leaders	Sp.	DIGESA	6-1-73	12-23-74	102	U. S.	520-L-01814	79,965
1	520-204-1-30077	Fruit Production	M. S.	Dir. Agr. Dev.	5-31-73	8-7-75	26	U. S.	520-L-01814	16,500
4	520-204-1-30078	Soil Seminar	Sp.	DIGESA/DECA	6-19-73	8-10-73	8	U. S.	520-L-01813	4,000
										307,990

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* Program originally financed with grant funds. Number of M/M indicates period of time funded under Loan.

** Incomplete

UNCLASSIFIED

Exhibit 9
Page 3 of 4

No. Part.	PIO/P	Title	Level/ Type	Employer	From	To	M/M	Country	DRA	Amount
1	520-204-1-40009	Entomology	M. S.	Dir. Agr. Dev.	CANCELLED		-0-	Mexico		-0-
1	520-204-1-40010	Plant Genetics	M. S.	Dir. Agr. Dev.	3-26-74	12-75	21	Peru	520-L-01802	12,420
1	520-204-1-40014	Agr. Marketing	M. S.	INDECA	CANCELLED		-0-	U. S.		-0-
1	520-204-1-40016	Agr. Economics	B. S.	DIGESA	1-11-74	12-76	24	U. S.	520-L-01814	19,200
1	520-204-1-50025	Soil Seminar	Sp.	ICTA	6-13-75	8-1-75	1½	U. S.	520-L-01814	2,288
1	520-204-1-60001	Agro-Ind. Dev.	Sp.	NEPC	9-29-75	7-5-76	9	U. S.	520-L-01814	15,750
1	520-204-1-60002	Sorghum	M. S.	ICTA	CANCELLED		-0-	U. S.		-0-
1	520-204-1-60006	Plant Pathology	M. S.	Dir. Agr. Dev.	1-76	12-76	12	U. S.	520-L-01814	7,800
1	520-204-1-600__	Soil Science	M. S.	ICTA	1-76	12-76	12	Mexico	520-L-01814	8,100
										373.548

11-13-75
sbf

UNCLASSIFIED
Exhibit 9
Page 4 of 4

TELEGRAM

25 MAR 75
FM SECSTATE WASHDC
TO AMEMBASSY GUATEMALA 9269
AIDAC
SUBJECT: IRR- SMALL FARMER DEVELOPMENT

1. BASED ON DAEC REVIEW, THE SUBJECT IRR IS APPROVED SUBJECT TO THE FOLLOWING GUIDANCE AND CONDITIONS INCLUDING THE SUBMISSION OF AN INTERIM REPORT FOR REVIEW BY THE DAEC. INTENSIVE REVIEW OF THE PROPOSAL IS APPROVED WITH THE UNDERSTANDING THAT USAID WILL INITIALLY FOCUS THE INTENSIVE REVIEW EFFORT ON THE REQUIREMENTS FOR THE PREPARATION OF THE INTERIM REPORT DISCUSSED IN PARA "J" BELOW UNTIL IT HAS BEEN REVIEWED BY THE DAEC. FURTHER GUIDANCE WILL FOLLOW AFTER THE DAEC'S REVIEW OF THE INTERIM REPORT.

A. EVALUATION OF PRIOR ASSISTANCE: DURING INTENSIVE REVIEW AN EVALUATION SHOULD BE COMPLETED OF PRIOR A.I.D. ASSISTANCE TO THE AGRICULTURE SECTOR IN GUATEMALA. THE EVALUATION SHOULD ADDRESS THE FINDINGS AND RECOMMENDATIONS OF THE LA/DP INTER-COUNTRY EVALUATION OF AGRICULTURE SECTOR PROGRAMS. IN ADDITION, THE FARM LEVEL FINDINGS OF THE COOPERATIVE AND PENNY FOUNDATION PROGRAM EVALUATION CURRENTLY IN PROCESS, SHOULD BE ANALYZED AND REVIEWED AGAINST THE FINDINGS OF THE DRAFT GUATEMALA FARM POLICY ANALYSIS. THE INTERIM REPORT SHOULD INCLUDE CONCLUSIONS FROM THIS ANALYSIS AND REVIEW WHICH BEAR ON THE PURPOSES AND DESIGN OF THE PROPOSED CREDIT PROGRAM.

B. PROFITABILITY ANALYSIS: ANALYSIS OF FARM LEVEL PROFITABILITY SHOULD BE COMPLETED FOR EACH MAJOR CROP TO BE FINANCED UNDER THE LOAN INTER ALIA TO DETERMINE THE LEVEL OF TECHNOLOGY SUITABLE TO SMALL FARMERS IN THE TARGET REGIONS AND WHETHER THE POTENTIAL RETURNS TO THE FARMER FROM TECHNICALLY FEASIBLE ALTERNATIVES PROVIDE SUFFICIENT INCENTIVE FOR THE UTILIZATION OF CREDIT. TO THE EXTENT POSSIBLE, THE ANALYSIS SHOULD ALSO INCLUDE INTERCROPPING AND NON-TRADITIONAL CROPPING POSSIBILITIES. ASSUMPTIONS CONCERN-

ING THE LEVEL OF TECHNOLOGY TO BE EMPLOYED (HIGH, LOW, INTERMEDIATE) AND THE COST OF INPUTS (PARTICULARLY FERTILIZER AND INSECTICIDES) AND OUTPUT PRICE SHOULD BE CLEARLY SPELLED OUT. THIS ANALYSIS SHOULD BE INCLUDED IN THE INTERIM REPORT.

C. CREDIT PROGRAM:

1. INTEREST RATE: THE INTEREST RATE CHARGED BY BANDESA FOR BASIC GRAINS AND OTHER CROP CREDIT MUST BE CAREFULLY CONSIDERED IN TERMS OF ITS DECAPITALIZATION EFFECTS ON BANDESA AND ITS POTENTIALLY ADVERSE EFFECTS ON DEVELOPMENT OF COOPERATIVES THE FIVE PERCENT RATE CHARGED BY BANDESA FOR BASIC GRAINS IS ONE WHICH A.I.D. CANNOT SUPPORT ABSENT AN EXTRAORDINARY JUSTIFICATION WHICH WAS NOT APPARENT AT THE DAEC'S REVIEW OF THE IRR. USAID SHOULD NEGOTIATE A SIGNIFICANTLY HIGHER INTEREST RATE AND FAILING THAT, SHOULD CONSIDER ELIMINATING CREDIT AS AN ELEMENT IN THE PROPOSED LOAN. USAID SHOULD ALSO BEAR IN MIND THAT A PROSPECTIVE A.I.D. LOAN TO COLAC WOULD PROVIDE THE POSSIBILITY OF CREDIT FOR FENACOAC. GIVEN BANDESA'S HEAVILY SUBSIDIZED RATES AND SINCE COLAC IS NOW LENDING AT NINE PERCENT, IT WOULD APPEAR THAT FENACOAC WOULD EFFECTIVELY BE ELIMINATED AS A COLAC CLIENT. A PROGRESS REPORT ON THE INTEREST RATE ISSUE MUST BE INCLUDED IN THE INTERIM REPORT

2. TARGET GROUP/REGIONAL FOCUS: GIVEN THE FACT THAT 87 PERCENT OF FARMS IN GUATEMALA ARE SEVEN HECTARES OR LESS, THE EIGHT HECTARE LIMIT PROPOSED IN THE IRR SHOULD BE CONSIDERED THE MAXIMUM FOR THE PURPOSES OF THE CREDIT PROGRAM, SINCE ON THE BASIS OF THE FINDINGS OF THE DRAFT GUATEMALA FARM POLICY ANALYSIS, IT APPEARS THAT THE IMPACT OF CREDIT ON FARMER NET INCOME IS MOST POSITIVE IN THE COUNTRY'S THREE POOREST REGIONS, THE MISSION SHOULD CONSIDER LIMITING THE CREDIT PROGRAM TO THE CENTRAL, NORTHEAST, AND SOUTHEAST HIGHLANDS AND THE NEW LAND AREAS (SEE PARA F BELOW). SINCE MOST FARMS IN THESE AREAS ARE APPARENTLY WELL BELOW THE EIGHT HECTARE MAXIMUM, THE REGIONAL FOCUS WOULD BE THE MORE SIGNIFICANT LIMITING FACTOR AND EIGHT HECTARE SIZE WOULD BE A COMPLEMENTARY LIMIT.

3. DELIVERY SYSTEM: THE CAP SHOULD DISCUSS THE VARIOUS

DELIVERY SYSTEMS THROUGH WHICH CREDIT WILL BE CHANNELED. IT SHOULD CONTAIN A TIME-PHASED PLAN FOR THE DEVELOPMENT OF DELIVERY SYSTEMS NOT NOW IN PLACE (I.E., THE GUIA SYSTEM) INCLUDING LEADER SELECTION AND TRAINING.

4. PROCEDURES: USAID SHOULD REVIEW THE PROCEDURES EMPLOYED BY BANDESA IN IMPLEMENTING THE CREDIT PROGRAM AND THE CAP SHOULD REFLECT THIS REVIEW. THE PREPARATION OF INDIVIDUAL FARM PLANS, PARTICULARLY, SHOULD BE REVIEWED IN LIGHT OF THEIR UTILITY, ON THE ONE HAND, AND THEIR COST IN TERMS OF THE BANDESA/DIGESA AGENT'S TIME. THE VIEW OF THE DAEC IS THAT THE PRACTICE OF REQUIRING INDIVIDUAL FARM PLANS AS A CONDITION TO RECEIVING CREDIT IS EXCESSIVELY CUMBERSOME. THE CAP SHOULD DISCUSS THE CIRCUMSTANCES UNDER WHICH TECHNICAL ASSISTANCE AND FARM PLANS SHOULD AND WILL BE REQUIRED.

5. PERMANENCY OF THE CREDIT FUND: THE CREDIT RESOURCES PROVIDED UNDER THE PROPOSED LOAN AND AS AS THE GOG'S CONTRIBUTION, SHOULD CAPITALIZE A PERMANENT FUND WHICH MEETS THE CRITERIA AND FURTHERS THE PURPOSES TO BE ESTABLISHED AS THE BASIS FOR THE PROGRAM. USAID SHOULD NEGOTIATE A GOG COMMITMENT TO MAINTAIN THE LEVEL OF LOAN AND BORROWER INPUTS INTO THE FUND.

D. INSTITUTIONS/COORDINATION: THE CAP SHOULD REFLECT AN ANALYSIS OF THE CAPABILITIES OF THE PARTICIPATING INSTITUTIONS PARTICULARLY AS THEY RELATE TO THE EFFECTIVE IMPLEMENTATION OF THE PROGRAM. THE ANALYSIS SHOULD FOCUS ON THE NEED FOR QUALITATIVE IMPROVEMENTS AND ADDITIONS TO STAFF AND CORRESPONDING ADDITIONAL BUDGET TO SUPPORT THE CREDIT EXPANSION AND ALTERNATIVE DELIVERY SYSTEMS. IN PARTICULAR, ATTENTION SHOULD BE GIVEN TO ICTA'S ROLE IN DEVELOPING TECHNOLOGY AND CROPPING SYSTEMS OF VALUE TO THE SMALL FARMERS IN THE TARGET REGIONS. THE MECHANISM(S) TO COORDINATE GOG EFFORTS IN THE REGIONS WHERE PROJECT RESOURCES WILL BE CONCENTRATED, SHOULD BE DESCRIBED IN THE CAP.

E. TRAINING: THE PROJECT DESIGN SHOULD INCLUDE SELECTION CRITERIA AND CURRICULUM FOR AGRICULTURE IN-SERVICE AND VOCATIONAL TRAINING WHICH ADDRESS CULTURAL AND LANGUAGE BARRIERS

IDENTIFIED AS SERIOUS CONSTRAINTS IN DELIVERING CREDIT AND TECHNOLOGY TO THE HIGHLAND INDIANS.

F. LAND ACCESS STUDY: THE DAEC CONCLUDED THAT THE LAND ACCESS STUDY SHOULD GO FORWARD ONLY IN THE CONTEXT OF AN OVERALL STRATEGY FOR THE DEVELOPMENT OF NEW LANDS AS AN ALTERNATIVE APPROACH TO THE LAND TENURE/USE PROBLEM. TOWARD ENCOURAGING A GOG STRATEGY AND THE DEVELOPMENT OF A PROGRAM ALONG THESE LINES, USAID SHOULD CONSIDER THE POSSIBILITY OF FINANCING PILOT ACTIVITIES IN THE LOAN FOR THE NEW LAND AREAS INVOLVING MINIMAL INFRASTRUCTURE (E.G., LOW STANDARD FEEDER ROADS) AND SERVICES. TO FACILITATE THE DELIVERY OF INPUTS AND MARKETING, INCLUDING INVESTMENT AND PRODUCTION CREDIT, DIFFERENT APPROACHES TO GROUP FORMATION SHOULD ALSO BE CONSIDERED DEPENDING ON THE MANNER IN WHICH LAND IS TRANSFERRED TO SMALL FARMERS (I.E., COLLECTIVES OR COOPERATIVES OF INDEPENDENT SMALL FARMERS). IF USAID WISHES TO PROCEED WITH THE DEVELOPMENT OF THIS ELEMENT, THE INTERIM REPORT MUST ELABORATE IT IN TERMS OF THE CONSTRAINTS TO BE ADDRESSED, THE EVOLVING OVERALL STRATEGY, THE PROJECT ACTIVITIES TO BE FINANCED, AND THE POSSIBLE NEED AND PROSPECTS FOR, and PROJECTED TIMING OF ADDITIONAL LEGISLATION TO PROVIDE A BASIS FOR THE PROGRAM.

G. RURAL INFRASTRUCTURE: CRITERIA FOR THE ROAD IMPROVEMENT ACTIVITY SHOULD BE BROADENED TO INCLUDE CONSIDERATION OF ECONOMIC POTENTIAL AS WELL AS OF LABOR SUPPLY. THE ANALYSIS OF THIS ELEMENT SHOULD BE PRESENTED IN SUFFICIENT DETAIL TO ESTABLISH A SOUND BASIS FOR COST ESTIMATES AND BENEFITS RESULTING FROM THE PROGRAM. PROVISION FOR MAINTENANCE SHOULD BE CLEARLY SPELLED OUT. THE INFRASTRUCTURE ACTIVITIES SHOULD BE FOCUSED IN THE SAME AREAS AS THE CREDIT PROGRAM FINANCED UNDER THE PROPOSED LOAN.

H. EVALUATION PLAN: THE CAP SHOULD CONTAIN AN EVALUATION PLAN, FINANCED WITH LOAN FUNDS TO THE EXTENT REQUIRED, WHICH IS RELATED TO ALL COMPONENTS AND WHICH INTER ALIA PROVIDES FOR THE ESTABLISHMENT OF A BASELINE AND FOLLOW-UP SURVEYS AT THE FARM LEVEL.

I. LOAN FUNDING GRANT PROJECTS: DURING INTENSIVE REVIEW, USAID SHOULD NEGOTIATE TOWARD THE PROPOSED LOAN'S SUBSUMING THE MAXIMUM APPROPRIATE AMOUNT OF PROGRAMMED, GRANT-FINANCED AGRICULTURAL

TECHNICAL ASSISTANCE.

j. INTERIM REPORT: USAID IS REQUESTED TO PREPARE AN INTERIM REPORT FOR THE REVIEW OF THE DAEC IN JULY/AUGUST COVERING THE FOLLOWING AREAS: (1) AN ELABORATION OF THE CURRENT PURPOSES OF THE LOAN; (2) CONCLUSIONS STEMMING FROM ANALYSIS AND REVIEW OF THE FARM LEVEL FINDINGS OF THE COOPERATIVE EVALUATION AND DRAFT FARM POLICY ANALYSIS AS DISCUSSED IN PARA A. (WHILE NOT A REQUIREMENT FOR THE REPORT, USAID IS ENCOURAGED TO COMPLETE AND INCLUDE IN THE INTERIM REPORT, A SUMMARY OF THE OVERALL EVALUATION OF PRIOR ASSISTANCE DISCUSSED IN PARA. A); (3) PROGRESS WITH RESPECT TO THE AGRICULTURE CREDIT INTEREST RATE CHARGED BY BANDESA AS DISCUSSED IN PARA. C.1; (4) A REPORT ON THE NEW LAND ELEMENT INCLUDING OVERALL STRATEGY AND PROJECT ACTIVITIES AS DISCUSSED IN PARA F.; AND 95) FARM LEVEL PROFITABILITY ANALYSIS AS DISCUSSED IN PARA. B.

K..FIXED AMOUNT REIMBURSEMENT: THE CAP SHOULD REFLECT USAID'S CONSIDERATION OF POSSIBLE APPLICABILITY OF FIXED AMOUNT REIMBURSEMENT TECHNIQUE WITH PARTICULAR REFERENCE TO RURAL INFRASTRUCTURE ELEMENT OF THE LOAN.

KISSINGER

TELEGRAM

P 131952Z NOV 75
FM SECSTATE WASHDC
TO AMEMBASSY GUATEMALA PRIORITY 1821/22/23
UNCLAS STATE 269216

AIDAC

SUBJECT: DAEC REVIEW OF SMALL FARMER DEVELOPMENT INTERIM REPORT

1) THE DAEC REVIEWED SUBJECT INTERIM REPORT ON OCTOBER 29, 1975. THE PROGRAM OUTLINED IN THE REPORT WAS APPROVED IN PRINCIPLE AND THE MISSION IS AUTHORIZED TO PROCEED IN DEVELOPING A PROJECT PAPER (PP) FOR LOAN AND GRANT FUNDING. THE PP SHOULD ADDRESS THE FOLLOWING CONCERNS EXPRESSED BY THE DAEC.

2) PROGRAM STRATEGY - THE DAEC QUESTIONED THE APPARENT LACK OF A STRATEGY UNIFYING THE FOUR ACTIVITIES INTO A COHERENT, FOCUSED PROGRAM. AS PRESENTED, EACH ACTIVITY APPEARS TO BE A DISCRETE RESOLUTION OF AN UNRELATED TARGET GROUP CONSTRAINT AND COULD THEREFORE BE FUNDED AS INDIVIDUAL PROJECTS SINCE THERE DID NOT APPEAR TO BE ANY ORGANIC INTERDEPENDENCE. THE MISSION IS REQUESTED TO PROVIDE A STRATEGY STATEMENT IN THE PP WHICH PROVIDES A BASIC PROGRAM FOCUS UNIFYING THE ACTIVITIES AND SERVING TO PROVIDE A RATIONALE FOR SELECTION OF SPECIFIC PROGRAM ACTIVITIES. PRELIMINARY DISCUSSIONS WITH MISSION REPRESENTATIVES SUGGESTS A POSSIBLE FOCUS ON RELIEVING THE LAND CONSTRAINT IN THE MOST POPULATED AREAS OF THE COUNTRY. THIS FOCUS IS SUPPORTED BY: I) THE OPENING OF NEW LANDS INCLUDING 'ACCESS ROADS' ETC.; II) IMPROVING EXISTING FARM LANDS INCLUDING IMPROVED ACCESS; AND III) A SECTOR-WIDE HUMAN RESOURCES ACTIVITY PROVIDING TRAINED MANPOWER AND BETTER PLANNING AND MANAGEMENT OF THIS LOAN AND OTHER SECTOR PROGRAMS.

THE PROGRAM SHOULD BE PUT INTO CONTEXT BY DISCUSSING THE LAND CONSTRAINT PROBLEM ALONG WITH THE ACTIONS THE GOVERNMENT IS AND HAS BEEN TAKING TO RELIEVE THE PROBLEM. THE POSSIBILITIES FOR A MORE TRADITIONAL LAND REFORM EFFORT SHOULD BE DISCUSSED. THE DISCUSSION OF THE STRATEGY SHOULD ALSO INDICATE THE RATIONALE FOR THE RELATIVE LEVEL OF EFFORT OF EACH ACTIVITY, I.E., WHY SHOULD THERE NOT BE LESS EFFORT EXPENDED ON NEW LAND SETTLEMENT AND MORE ON EXISTING LAND IMPROVEMENT?

3) TARGET-GROUP - THE MISSION'S PRESENTATION ON THE TARGET GROUP DURING THE DAEC REVIEW INDICATED CONSIDERABLE THOUGHT AND EFFORT BY THE PROJECT COMMITTEE. THIS PRESENTATION ON THE IDENTITY OF THE TARGET GROUP, LOCATION, AND DESCRIPTION OF OVERALL NEEDS SHOULD BE INCLUDED IN THE PP.

4) INTEREST RATE - THE DAEC AGREED THAT WHILE NOT SPECIFICALLY INJURIOUS TO THIS LOAN'S OBJECTIVES, THE ISSUE OF BANDESA'S SUBSIDIZED INTEREST OF 5 PERCENT FOR PRODUCTION CREDIT WAS A SERIOUS POLICY ISSUE SINCE IT WOULD HAVE AN ADVERSE IMPACT ON THE GROWTH OF COOPERATIVES, A KEY AID-SUPPORTED MECHANISM FOR REACHING THE TARGET GROUP IN GUATEMALA. IT WAS ALSO AGREED THAT THE PROPOSED IDB PRODUCTION CREDIT LOAN PROVIDED THE NECESSARY MECHANISM TO ENCOURAGE A GOG REVIEW OF THE BANDESA INTEREST POLICY. CONSEQUENTLY, THE MISSION SHOULD I) CONTINUE TO PURSUE WITH THE GOG A REVIEW OF BANDESA INTEREST RATE POLICY LEADING TO A MORE REALISTIC RATE; AND II) INDICATE TO IDB REPRESENTATIVES OUR CONCERN IN VIEW OF THEIR UPCOMING LOAN. AID/W, IN TURN, WILL PURSUE THE INTEREST RATE ISSUE WITH THE IDB IN WASHINGTON TO SEE IF THE BANK WILL INSIST ON A HIGHER SUBLENDING RATE. IN DISCUSSING THE ROLE OF BANDESA UNDER PARA 6 BELOW, THE MISSION SHOULD REVIEW THE EXTENT TO WHICH THE 5 PERCENT INTEREST RATE IMPAIRS THE FINANCIAL VIABILITY OF THE BANK OR MIGHT OTHERWISE PREVENT THE BANK FROM EFFECTIVELY ADMINISTRATING THE CREDIT TO BE CHANNELED THROUGH THE BANK.

5) GOG COMMITMENTS - THE INTERIM REPORT DID NOT IDENTIFY SPECIFIC COMMITMENTS TO BE OBTAINED FROM THE GOG WHICH ARE ESSEN-

TIAL TO THE SUCCESS OF THE PROGRAM AND TO EACH ACTIVITY. THESE INCLUDE BOTH LEGISLATIVE AND ADMINISTRATIVE BASES FOR PROGRAM ACTIVITIES, INSTITUTIONAL CHANGES, AND BUDGETARY COMMITMENTS. THE MISSION IS REQUESTED TO IDENTIFY IN THE PROJECT PAPER ALL GOG POLICY ACTIONS CONSIDERED ESSENTIAL TO THE SUCCESS OF THE PROGRAM, ALONG WITH AVAILABLE INFORMATION/EVIDENCE IN SUPPORT OF THE GOG'S COMMITMENT TO CARRY OUT THESE ACTIONS. DISCUSSIONS OF BUDGETARY CONTRIBUTIONS SHOULD SPECIFY WHICH ARE IN ADDITION TO EXISTING LEVELS OF SUPPORT.

6) NEW LANDS SETTLEMENT - THE PP SHOULD INDICATE CLEARLY THE DIFFERENCE IN THE PROPOSED LAND SETTLEMENT APPROACH FROM TRADITIONAL INTA PROGRAMS AND DISCUSS THE POTENTIAL UTILITY, INCLUDING COST TO THE GOG, OF THE NEW APPROACH AS A MODEL FOR FUTURE REPLICATION IN THE REST OF THE NORTHERN TRANSVERSAL STRIP AS WELL AS IN THE PETEN. IN ADDITION, THE PP SHOULD CLEARLY IDENTIFY I) THE ELIGIBILITY CRITERIA FOR SELECTING COLONISTS, II) THE ROLE OF THE GOG AGENCIES AND COOPERATIVE ORGANIZATIONS IN THE IMPLEMENTATION OF THE LAND SETTLEMENT PROGRAM, III) THE CAPACITY OF THESE INSTITUTIONS TO PERFORM THEIR RESPECTIVE FUNCTIONS INCLUDING ANY INCREASES IN STAFFING AND BUDGETS REQUIRED TO MEET INCREASED RESPONSIBILITIES, AND IV) THE COORDINATION MECHANISMS WHICH WILL BE EMPLOYED TO ASSURE TIMELY AND EFFICIENT IMPLEMENTATION OF THE PROGRAM.

A COST/BENEFIT ANALYSIS FOR THE LAND SETTLEMENT PROGRAM SHOULD ALSO BE INCLUDED IN THE PP AS WELL AS A FARM LEVEL PROFITABILITY ANALYSIS.

ASSURANCE SHOULD BE OBTAINED FROM THE GOVERNMENT OR THE PRIVATE SECTOR THAT THE ACCESS ROAD TO THE SETTLEMENT AREA WILL IN FACT BE CONSTRUCTED IN A TIMELY MANNER.

IN DISCUSSING THE BENEFITS ACCRUING TO THE TARGET GROUP FROM THIS ACTIVITY, WE ASSUME THE MISSION WILL INCLUDE TO EXTENT POSSIBLE BENEFITS ACCRUING TO THOSE LEFT BEHIND, E.G., REDUCTION IN POPULATION PRESSURE ON THE LAND.)

7) LAND IMPROVEMENT - THE PROJECT PAPER SHOULD PROVIDE A FULL DISCUSSION OF THE ADMINISTRATIVE AND ORGANIZATIONAL METHODS TO BE UTILIZED IN IMPLEMENTING THE IRRIGATION PROJECTS, INCLUDING AN ANALYSIS OF EXISTING AND ANTICIPATED WATER RIGHTS ISSUES, WATER USE AND IRRIGATION MANAGEMENT TECHNIQUES AND HOW THESE WILL BE HANDLED UNDER THE LOAN. IN ADDITION, A COST-BENEFIT ANALYSIS SHOULD BE INCLUDED FOR REPRESENTATIVE IRRIGATION PROJECTS AS REQUIRED BY FAA 611 (B) AND IN ACCORDANCE WITH THE MEMORANDUM OF THE PRESIDENT DATED MAY 15, 1962 (SEE M.O. 1221.3).

THE DAEC QUESTIONED THE PROPOSED SOCIAL COST LABOR PAYMENTS FOR IRRIGATION PROJECTS IN VIEW OF THE ANTICIPATED ECONOMIC BENEFITS THAT WOULD ACCRUE TO THOSE INDIVIDUALS OR GROUPS RECEIVING TECHNICAL ASSISTANCE AND INTERMEDIATE CREDIT FOR SUCH PROJECTS. WHETHER LABOR PAYMENTS ARE PROJECT FUNDED OR NOT WOULD OF COURSE DEPEND ON THE ADMINISTRATIVE/ORGANIZATIONAL METHODS EMPLOYED FOR THE IRRIGATION ACTIVITIES; SHOULD SUCH PAYMENTS BE PROJECT FUNDED, THE PP SHOULD PROVIDE JUSTIFICATION. THE DAEC WAS IN GENERAL AGREEMENT WITH THE VALIDITY OF SOCIAL COST LABOR PAYMENTS FOR SOIL CONSERVATION ACTIVITIES GIVEN THE FACT THAT THE ECONOMIC BENEFITS INHERENT IN PREVENTING FURTHER SOIL LOSS ACCRUING TO THE INDIVIDUAL IN THE SHORT RUN PROBABLY DO NOT MEET HIS COSTS. HOWEVER, THE DAEC QUESTIONED THE APPROPRIATENESS OF AID FINANCING OF SUCH PAYMENTS. EVERY EFFORT SHOULD BE MADE TO FUND THESE PAYMENTS FROM THE GOG CONTRIBUTION. SHOULD THIS PROVE IMPOSSIBLE, the DAEC MIGHT CONSIDER LIMITED FUNDING, PREFERRABLY ON A PHASED BASIS WITH THE GOG PICKING UP AN INCREASING AMOUNT OF THE PAYMENTS. IN SUCH A CASE, THE PROJECT PAPER SHOULD PROVIDE JUSTIFICATION FOR AID LOAN FUNDING SUCH PAYMENTS INCLUDING REASONS FOR GOG REFUSAL TO FUND.

8) ACCESS ROADS - SINCE ONE OF THE OBJECTIVES IS TO GENERATE EMPLOYMENT, THE PP SHOULD DISCUSS THE EXTENT TO WHICH THE DIRECCION GENERAL DE CAMINOS (DGC) UTILIZES LABOR INTENSIVE METHODS IN ROAD BETTERMENT AND CONSTRUCTION NOW AND THE EXTENT TO AND THE MEANS BY WHICH THIS ACTIVITY PROPOSES TO SHIFT

THE DGC INTO GREATER USE OF LABOR INTENSIVE METHODS. ORGANIZATIONAL CHANGES REQUIRED SHOULD BE DISCUSSED. THE CRITERIA TO BE UTILIZED BY THE DGC FOR SELECTING THE ROAD ELEMENTS TO BE FINANCED UNDER THE LOAN SHOULD BE SPECIFIED IN THE PP AS WELL AS A COST-BENEFIT ANALYSIS REFLECTING THESE CRITERIA FOR SEVERAL REPRESENTATIVE PROJECTS. PROVISIONS FOR MAINTAINING THE LOAN-FINANCED ROADS SHOULD ALSO BE DISCUSSED. FINALLY, IT WAS AGREED THAT THE FIXED AMOUNT REIMBURSEMENT METHOD WOULD BE UTILIZED IF AT ALL POSSIBLE FOR THIS ACTIVITY.

9) HUMAN RESOURCES - A CLEAR RELATIONSHIP BETWEEN THE VARIOUS TRAINING ACTIVITIES AND THE NEEDS OF THE SECTOR ORGANIZATIONS SHOULD BE ESTABLISHED IN THE PAPER. IN ADDITION, THE MISSION IS REQUESTED TO DISCUSS THE TIMING BETWEEN THE PROPOSED TRAINING COURSES AND SECTOR IMPLEMENTATION ACTIVITIES.

THE DAEC QUESTIONED THE PROPOSED USE OF LOAN FUNDS FOR SALARIES AND OPERATING EXPENSES. IN PRINCIPLE, THESE SHOULD BE FUNDED FROM THE GOG CONTRIBUTION. LOAN FUNDING OF SUCH EXPENSES IS TO BE LIMITED TO THE ABSOLUTE MINIMUM REQUIRED FOR THE TIMELY ACHIEVEMENT OF THE PROGRAM OBJECTIVES AND ONLY AFTER A CLEAR RATIONALE IS PROVIDED FOR GOG INABILITY TO FINANCE.

THE SUPPORT TO THE PLANNING OFFICE PROPOSED IN THE INTERIM REPORT, ADDRESSING THE LACK OF GOG AGRICULTURAL SECTOR PLANNING AND COORDINATING, IS THE LARGEST GRANT FUNDED ELEMENT. ACCORDINGLY, THIS COMPONENT SHOULD RECEIVE MORE ATTENTION AND ANALYSIS THAN WAS REFLECTED IN THE INTERIM REPORT. THE ANALYSIS SHOULD DEMONSTRATE THAT THE PROPOSED ORGANIZATION, STAFF TRAINING, AND OPERATIONS ARE ADEQUATE TO FILL OVERALL SECTOR PLANNING NEEDS AND RESOLVE THE COORDINATION PROBLEM.

10) TECHNICAL ASSISTANCE - ALTHOUGH IT WAS RECOGNIZED THAT THERE ARE VALID REASONS FOR GRANT FUNDING TA, THE MISSION IS REQUESTED TO MAXIMIZE THE FINANCING OF TECHNICAL ASSISTANCE WITH LOAN FUNDS. THE PROJECT PAPER SHOULD PRESENT A CONVINCING JUSTIFICATION (QUALITY CONTROL, PROJECT DEVELOPMENT, PRIORITY AREA NOT FULLY RECOGNIZED BY GOVERNMENT, ETC?) FOR WHATEVER GRANT FUNDED TECHNICAL ASSISTANCE IS PROPOSED.

11) LIFE OF PROJECT - THE RATIONALE FOR THE PROPOSED FIVE-YEAR PROGRAM IMPLEMENTATION PERIOD MUST BE EXPANDED UPON THE PROJECT PAPER. WHILE THE ANNUAL WORK CYCLE ARGUMENT PRESENTED FOR THE LOAN FINANCED LAND SETTLEMENT PROGRAM, LABOR-INTENSIVE ROAD CONSTRUCTION AND LAND RESOURCES IMPROVEMENTS CONTAINED SOME MERIT, THE PROPOSAL FOR FIVE YEARS OF CONTINUOUS GRANT FINANCED TA IS VIEWED AS EXCESSIVE. IT WAS CONSIDERED HIGHLY UNLIKELY THAT TECHNICAL ASSISTANCE REQUIREMENTS COULD BE ESTABLISHED WITH ANY PRECISION FOUR OR FIVE YEARS IN ADVANCE. THE MISSION IS REQUESTED TO REVIEW THE GRANT FINANCED TA PROGRAM REQUIREMENTS AND CONSIDER A SHORTER PERIOD (E.G., THREE YEARS).

12) MARKET POTENTIAL - THE PROJECT PAPER SHOULD INCLUDE PRELIMINARY INFORMATION ON THE MARKET POTENTIAL FOR CROPS WHICH WILL BE PLANTED ON THE FARMS INCLUDED IN THE IRRIGATION ELEMENT OF THE LAND RESOURCES IMPROVEMENT ACTIVITY AND THE NEW LANDS SETTLEMENT ACTIVITY.

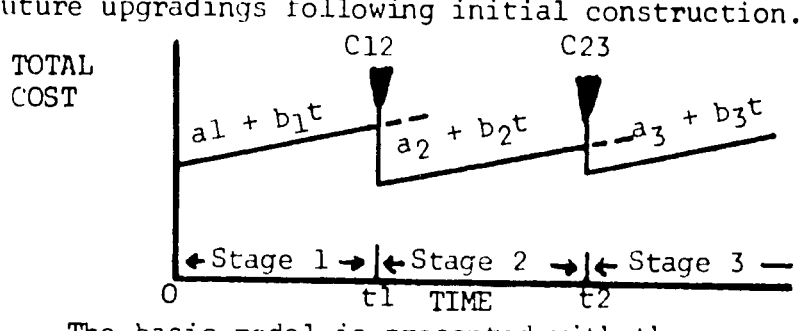
13) ENVIRONMENTAL IMPACT AND EVALUATION - THE PAPER SHOULD INDICATE AN ENVIRONMENTAL IMPACT STATEMENT AND PROGRAM EVALUATION PLAN. KISSINGER.

GUATEMALA SETTLEMENT PROJECT
STAGE CONSTRUCTION ANALYSIS FOR SAN ANTONIO ROAD

The model presented herein* has the advantage that only the stages need be exogenously specified, and the optimal timings will be shown for those stages proposed. This computation is simple enough to be done by hand, even for a number of alternative stages.

In short, the model consists of a process in which the total present worth, or discounted value, of all future costs on a particular road are minimized at some specific discount rate, where the variables, are the times of upgradings. The costs considered are the upgrading costs, the vehicle operating and the road maintenance costs within each stage. No account was taken in the model of possible future differential price escalation in respect of future upgrading investments.

It is assumed that an initial construction to some low standard is to be accomplished at time zero (or a road of low standard already exists), and any specified sequence of upgradings may then be considered at future points in time. For example, the initial standard may be an earth road, with subsequent upgradings to gravel and then paved surfaces. Unit operating and maintenance costs within each stage rise with increasing flow, while incremental improvement costs are fixed amounts. These cost flows are illustrated by the "sawtooth" pattern in the figure below, which shows two future upgradings following initial construction.



The basic model is presented with the assumption of linearly increasing traffic flow over time, and vehicle operating and road maintenance.

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*Willard D. Weiss, IBRD Journal of I.E.M. Vol. 11, March 1971.

The expression for the present worth at time zero of all future cash flows is as follows (for the specific case in which only two future upgradings are considered):

$$P = \int_{T_0}^{T_1} \left(a_1 + b_1 t\right) e^{-rt} \Delta, + C_{12} e^{-rt}$$

$$+ \int_{T_1}^{T_2} \left(a_2 + b_2 t\right) e^{-rt} \Delta, + C23 e^{-rt}$$

Where P equals the present worth discounted costs incurred during an infinite time period T by improving facilities at times t1 and t2. The Remaining terms in the equation are parameters representing the cost characteristics of each stage. The parameters, a and b determine the linear cost function within each stage in terms of flow, which in turn is expected in terms of time t for a linearly increasing demand. The parameter Cij is the incremented cost of improvement from stage i to stage j, where i = 1,2 and j=2,3. The interest rate, or cost of capital, is represented by r. Continuous discounting is used, which allows the present worth factor to be expressed in the form e- rt integrated over t. The analysis presented here identifies the points in time Y for which the present worth of all costs over time T (i) a minimum.

$$t_1 = \frac{rC_{12} - \left(a_1 - a_2\right)}{\left(b_1 - b_2\right)}$$

$$t_2 = \frac{rC_{23} - \left(a_2 - a_3\right)}{\left(b_1 - b_2\right)}$$

There will be at least one optimal set of timings for t1 and t2 which minimizes the present worth of total costs. This is obtained by differentiating the total present worth expressions using partial derivatives setting the results equal to zero, and solving for t1 and t2.

$$t_i = \frac{rC_{ij} - (a_i - a_j)}{(b_i - b_j)}$$

By inspection, the results can be generalized in the form where the values of tl represent the optimal timings for any number of sequential upgradings from stage i to stage j.

LABOR INTENSIVITY AND THE ACCESS ROAD CONSTRUCTION

Recently, AID, IBRD and other international donor agencies have investigated labor substitution effects on road construction,* i.e., labor intensive studies, largely to promote a methodology which would encourage the lesser developed countries to initiate labor intensive civil works.

The outcome of the preliminary reports suggests that from a financial point of view, the present mix of equipment to hand labor has reached a marginal value of productivity that is optimal. Generally, the criteria used have been efficiencies of machinery and natural resources versus the labor substitution while maintaining productivity within the particular civil work.

As a result of some of the early studies, a shift in the analytical approach was taken that departed from a purely financial viewpoint to one of economic viewpoint that would reflect the real worth of labor or market distortions within the economy.

In short, that approach sought out activity replacement techniques, and adopted road design standards that would emphasize labor inputs. For example, a road designed for asphaltic concrete surface, a heavily capital intensive activity, might be replaced with a water bound macadam technique which lends itself to a more labor bias. Unfortunately, the brunt of this approach was to ignore the construction system as a whole, and the necessary interactivity of specific pieces of equipment with the various construction activities. To focus on individual work activities ignores the economies of scale, cost-effectiveness of equipment and the complexity of mobilization costs with regards to short term utilization and overall regional scheduling. While this approach (of intermediate (labor) technology) produced incentives and broadened the analysis base for future project designers it produced only results indicative of labor markets such as India or China. For example, in one such study the replacement of one D8 crawler tractor

*1. AID Management Practices as They Relate to Employment Problems of the LDC. John Eriksson, Henrietta Towsley.

2. World Book Study of Substitution of Labor & Equipment in Civil Construction. Tech Memo 1975. Scott Wilson, Kirk Patrick & Partners UK.

for 70-days required* 26,125 man-days to perform the same activity. Obviously, labor in the Central American context could not reach this magnitude. One other assumption, which is often debatable, is the unlimited construction time of each activity. Other implications such as the supply prices of all resources, including labor, are assumed to be infinitely elastic. It is rather dubious whether this assumption is realistic especially with regard to labor.

The Question of Construction Uniformity

Arguments for equivalency of the finished product of road have been forwarded by most constructors to favor the more machine intensive product.** For instance, machine laid surfacing to hand laid surface was compared in India, holding uniformity of finished product and time of completion constant. The "rideability" of the finished surface was measured with a standard broad-beam, which essencially measures the depression (or smoothness) within a standard linear measure. When the final results were tallied they favored the machine placed asphaltic surface, at a riding speed equivalent to 40 miles per hour. The outcome of course, recommended the machine application, but ignored the fact that, cet. par., the labor aspect was, indeed, truly competitive. Had the stringent uniformity criteria been eased, the outcome may have been reversed. On the positive side, studies such as these demonstrate that the adoption of high standards of design do not explain the bias towards machine-intensive technology. More important, the bias stems from consultant engineers who draw their construction technology from an international market in which innovation has consistently moved in the direction of machine-intensive methods.

In short, Guatemalan access road standards, based upon low-volume truck traffic, negate the international criteria, the desirability of uniformity of construction, and certainly, provides the impetus to innovate on the more labor-intensive side of the equation. The question of construction uniformity, in view of the adoption of low-order standards and the

* Technical Memorandum No. 3, Comparison of Different Modes of Haulage. IBRD Study of the Substitution of Labor and Equipment in Civil Construction. June 1975.

** Technical Memo No. 5, IBRD, Comparison of Hand-Laid and Machine Laid Surface. February 1975.

low traffic projection appears moot.

The lessons learned from the aforementioned studies are invaluable with regards to the new innovative techniques favoring the more labor intensive road activities. Compiling these studies along with the assistance of a PERT/management computer tool, provided an important departure for the following analysis.

PERT Analysis: Management Techniques and the Financial Aspects

The criteria set forth tailor several points of interest to both AID and the GOG. Essentially, to maximize labor, and retain the rough order of timeliness for project completion. The first order of investigation included:

1. The formulation of one-kilometer of mountainous road, with a general engineer efficient system. That is, a mix of labor and machine to maximize production and produce an acceptable secondary road within rural Guatemala. The construction technique utilized in the machine-intensive case was compiled to best reflect the average equipment available and to expand the project to include the more functional activities in detail. The test road, reflects reasonable and comparative earthwork and haulage to substantiate a synthesized case for the Type I construction. It should be noted that the viewpoint of the construction taken is that of a medium-sized contractor, with full cognizance of start-up and mobilization expenses; marking and signing of the road, final clean-up of the work area, which is usually required before acceptance by the contract letting agency. For simplicity, the construction activities are presented in their sequencial order of construction and by bidding item.

2. Once the synthesized road was estimated, with the above design, the detailed cost estimates were compiled into a PERT* package, which produced the individualized bid items along with their individual labor and equipment requirements. Each activity was then broken down to specific hourly rental and labor costs. The output, includes several displays, which illustrate the manpower requirements based upon a machine-intensive approach.

* PERT/Management: Scientific Time Sharing Corp--Bethesda, Md.; a copyright computer program.

3. In the same fashion, the labor intensive account was designed based upon the machine intensive construction configuration. That is, various labor intensive activities were introduced in the machine set to replace particular pieces of equipment. Consequently, the time of construction was lengthened slightly to meet the bounds of realism, while maintaining reasonable labor force all within the realm of the labor availability and administrative capabilities of a large labor gang. The final product, a labor-intensive configuration, was then subjected to the same PERT management tool, for final comparison

4. The first comparison simply involves time of completion, manpower, and total project costs based upon the financial viewpoint.

5. The last comparison, an economic one, suggests that the market value of unskilled labor is not truly represented in light of the spiralling unemployment in the highland area. (See the Shadow Wage argument, page ____). Therefore, all unskilled labor was shadow priced at zero* and resubmitted to the PERT management program, both under the mechanical as well as the labor intensive versions.

Summary of Results

Comparatively, the outcomes provide a financial and economic review as indicated on the following page.

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* The zero shadow wage was used for simplicity, actually the reservation price for labor is somewhat above 1/10th the market wage.

Coordination of Project Funds Disbursement and Scheduled Construction Activities

The scheduling of equipment rental value as compared to the hired labor amounts to $4810 peak demand to $553 peak demand. By defining the peak demand between the labor and machine intensive methods a relationship (and benchmark) for estimated and actual (evaluation) measures can be ascertained. As noted above, the labor intensive method yields a peak ratio of 8.6::1 while the machine intensive yields a peak ratio of 23.6::1. The advantage, given the social criteria set forth, clearly lies within the labor intensive method. Financially, however, the labor intensive method is more costly.

In terms of project fund disbursement, the labor intensive method will construct approximately 1.55 kilometers less than the machine intensive method given the same period of time. With a disbursement period of 4 years, and given 6 equipment spreads, the foregone production would amount to about 106.7 kms.

Realistically, given the 4 years disbursement, and a construction mix of 40, 30 and 30% of Type I, II, and III roads respectively, Caminos should construct approximately 280 kilometers of road.

	Hired/Km	Average Earnings per Project-Km	Peak Man-days* per Project-Km
unskilled labor	21 men	$ 130.32/man**	180
Skilled labor	5 men	434.40/man	82

PEAK EQUIPMENT DEMAND (Labor Intensive Method)

Equipment Type	Peak Requirement $/Week	Peak Quantity Required/Project
Crawler tractors D6C w/ripper	1300	1
Trucks, dump 3-yd. Bobtail	2250	4
Front end loader 1½ cy	1000	1
Motorgrader (12), w/scarifier	1260	1
Farm-all tractor, w/vib. roller	800	1
Water truck, w/pump	800	1
Con'c mixer 1/2 yd, (& vibrator) trailer mounted	240	1
Tools; hand etc***	1000 (Total/project)	-
Tilt-trailer (for D6C)	15	1
Administration (pick up)****	292	1

* See figure 5 skilled labor includes equipment operators;
** 6 days/week x 18.1 weeks x 1.20/day;
*** Hand tools; $5/piece, average = 200 pieces x 180 m-day peak;
**** Pick-up with 4 wheel drive, wench & trailer hitch for conc. mixer tow. Tilt-trailer to be used for D6C behind dump truck.

Discussion of Results

Normally, under the economic accounts the developmentalist emphasizes the unskilled labor as a major component of interest in their economic accounts. There are several reasons, but one which concerns AID mostly is the humanitarian aspects toward the "target man" as defined by the Congressional mandate. When combined with the employment situation, inter alia, there appears to be one additional result of this program, that tends to favorably support the labor intensive position.

Recalling the method used to develop the labor-intensive bid items, i.e., to substitute unskilled labor for machine items, that the result indicated that more skilled labor would be utilized for the labor intensive method. For example, under the machine-intensive method, skilled labor amounted to $800.00, as compared to $2,444 in the labor-intensive method. This gives rise to some interesting questions with regards to the project objectives and the equipment component suggested herein.

1. Why are there more skilled laborers required for the labor intensive method?

2. Where do the new equipment operators (and skilled laborers) come from?

The first question is simply answered; due to the increased need for administrative personnel, i.e., those required to supervise the additional unskilled labor; and, in essence, the increase in carpenters, masons and other artisans who will hand construct drainage head walls, etc. with rock rather than cast them with reinforced concrete. In answering the second question; there appears to be little doubt that the superintendents will be graduates from the existing caminos ranks (i.e., foreman) and foreman will come from the newly created unskilled ranks. Especially, those foremen who will supervise labor gangs in the hand spreading operations of the subbase aggregate etc.*

*Accordingly, the skilled labor in the work schedule indicates that under the "Excavation and Embankment" item, a substantial amount of the labor cost has been allocated to skilled labor. Since skilled labor is rated at its market value ($4.00/man-day), and this total represents a full shift of labor foreman (e.g., those graduated from the unskilled ranks) that portion of labor should logically be shadowed priced along with the more common unskilled labor.

Therefore, it seems logical to conclude, that some portion of the skilled labor represented in the labor-intensive method are really unskilled laborers who have achieved a rank promotion. In the computer array, they are listed as skilled labor. Nevertheless, they are technically unskilled and were unemployed in the "without project" case. It follows, then, that the newly created portion of skilled labor should be shadow priced at zero because of their non-productivity "without" the project. Also, since the rental cost of equipment includes the wet-rental situation (fuel, oil, grease) less operator, adjustments with regards to the skilled labor would be required only to the extent that the number of equipment operators are displaced.

By the same process, other extremely labor-intensive items were also shadow priced. For example, in the "Fine grade Roadway" bid item unskilled laborers displaced a motor grader to "even out" (with maddox, shovels, and rakes) the road grade. Again, these skilled laborers were substituted at a rate of 1 foreman to 10 laborers. On the average, ten percent of the remaining skilled labor was deducted to reflect the SWR of foreman labor.

Discrete Income Award per Beneficiary

Approximately 82% of the employment generated within the road project will undoubtably be unemployed campesinos all hired from the nearby villages, or from, the adjacent areas within the zone of influence of the road projects.

The determination of the unskilled labor requirement, along with the other construction components, were extracted from the PERT/Management schedule. Figure 3 illustrates the total labor and equipment requirements on a weekly and activity basis. Recalling that unskilled labor was valued at $1.20 per man-day and that labor demand follows the bell shaped curve as illustrated in figure 4, unskilled labor component can be measured with a rather high degree of confidence. The results suggest the following; based upon the average kilometer of construction.

FINANCIAL COST/KM

	Total Duration	Unskilled Labor Cost	Skilled Labor Cost	Machine Costs	Ratio of Mach/Unskilled Labor	Total Cost
Machine Intensive	11.7 wks.	$ 744	$ 800	36,745	49.4	43,883
Labor Intensive	18.1 wks.	2,333	2,444	35,849	15.4	47,137

Results: Labor Intensive is $3,254/Km more costly

Financial cost per job created = **$23.89**

ECONOMIC COST OF ROAD PER KM.

	Total Duration	Unskilled Labor	Skilled Labor	Machine Costs	Total Financial Cost	Total Economic Cost
Machine	11.7 wks.	0	800	36,745	43,883	43,139
Labor	18.1 wks.	0	684	35,849	47,137	43,044

Results: Labor Intensive is $95 - less costly than Machine Intensive

Labor Intensive creates 189 unskilled jobs/sub-project

Labor Intensive creates 45 skilled jobs/project

Total Economic Cost per job created = zero

PROJECT: GUATEMALA ROAD PJCT MACH INT W/O BRDGE PRINTED NOVEMBER 17,1975 PAGE 1
PERIOD: 1976

o EARLY START TO EARLY FINISH
• LATE START TO LATE FINISH
□ COMPLETED ACTIVITY EARLY START TO EARLY FINISH

SORTED BY EARLY START

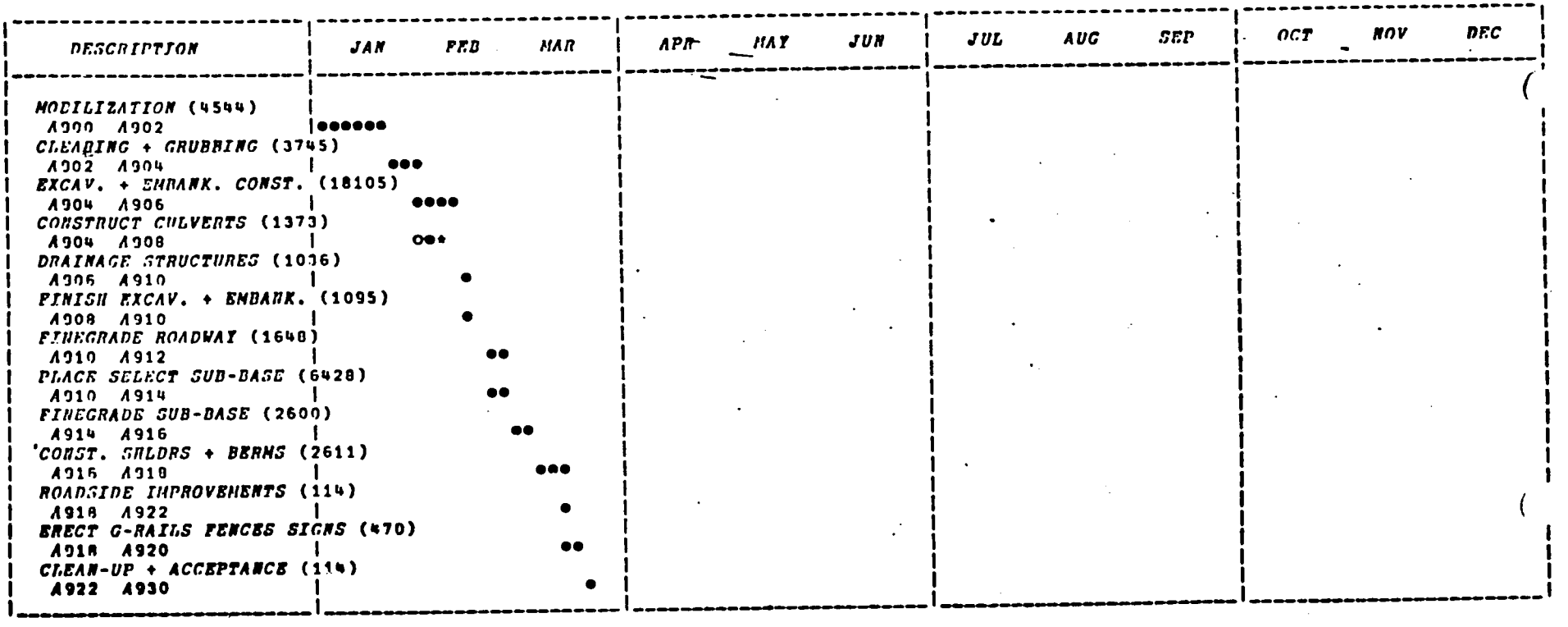


FIGURE 1

PERT DISPLAY: MACHINE-INTENSIVE

UNCLASSIFIED
Exhibit 12
Page 10 of 25

PROJECT: GUATEMALA ROAD PJCT LAB INT W/O BRIDGE PRINTED NOVEMBER 15,1975 PAGE 1
PERIOD: 1976

O EARLY START TO EARLY FINISH
• LATE START TO LATE FINISH
] COMPLETED ACTIVITY EARLY START TO EARLY FINISH

SORTED BY EARLY START

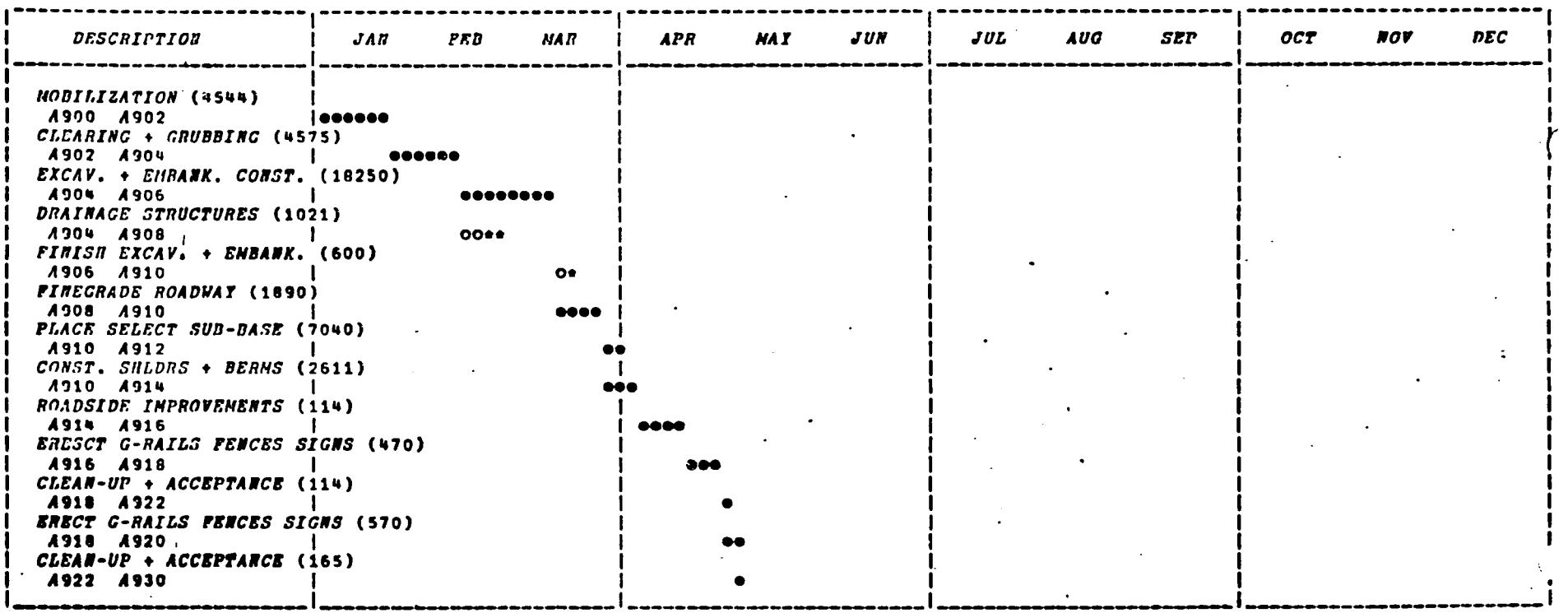


FIGURE 2

PERT DISPLAY: LABOR -INTENSIVE

GUATEMALA ROAD PROJECT LABOR INTENSIVE WITHOUT BRIDGE
PRINTED 11/15/75 AT 12.33.39

STARTING WEEK 12/29/75

CATEGORY	1ST	2ND	3RD	4TH	5TH	6TH	7TH	8TH	9TH	10TH	11TH	12TH	TOTAL
ADMINISTRATIVE	292.9	732.1	732.1	292.9	0	0	0	0	0	0	0	0	2050.0
TOOLS	142.9	357.1	357.1	142.9	0	0	0	0	0	0	0	0	1000.0
D6C CRAWLER TRACTOR	0	0	0	780.0	1300.0	1300.0	1300.0	1300.0	1300.0	1300.0	520.0	0	9100.0
UNSKILLED LABOR	0	0	0	135.0	225.0	225.0	198.0	90.0	67.5	67.5	131.0	60.0	1199.0
SKILLED LABOR	0	0	0	0	0	0	216.0	328.0	320.0	320.0	296.0	240.0	1720.0
MATERIALS	0	0	0	0	0	0	1073.3	557.8	250.0	250.0	1029.0	0	3160.1
CONC. MIXER + VIBR.	0	0	0	0	0	0	0	0	0	0	0	0	0
25T LORAIN CRANE	0	0	0	0	0	0	0	0	0	0	0	0	0
WELDERS W/EQUIP	0	0	0	0	0	0	0	0	0	0	0	0	0
TRUCKS	213.4	533.6	533.6	213.4	0	0	1125.0	1875.0	1875.0	1875.0	750.0	0	8994.0
MOTOR GRADER	0	0	0	0	0	0	0	0	0	0	0	0	0
FARM-ALL + VIB ROLLE	0	0	0	0	0	0	0	0	0	0	0	0	0
FRONT END LOADER	0	0	0	0	0	0	450.0	750.0	750.0	750.0	300.0	0	3000.0
WATER TRUCK	0	0	0	0	0	0	0	0	0	0	0	0	0
WEEKLY TOTALS	649.2	1622.0	1622.0	1564.2	1525.0	1525.0	4362.3	4900.0	4562.5	4562.5	3026.0	300.0	30223.1

GUATEMALA ROAD PROJECT LABOR INTENSIVE WITHOUT BRIDGE
PRINTED 11/15/75 AT 12.35.41

STARTING WEEK 03/22/76

CATEGORY	1ST	2ND	3RD	4TH	5TH	6TH	7TH	8TH	9TH	10TH	11TH	12TH	TOTAL
ADMINISTRATIVE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOOLS	0	0	0	0	0	0	0	0	0	0	0	0	0
D6C CRAWLER TRACTOR	0	0	0	0	0	0	0	0	0	0	0	0	0
UNSKILLED LABOR	186.0	198.0	187.5	187.5	75.0	187.5	112.5	0	0	0	0	0	1134.0
SKILLED LABOR	228.0	148.0	40.0	40.0	100.0	124.0	44.0	0	0	0	0	0	724.0
MATERIALS	0	0	0	0	0	225.0	75.0	0	0	0	0	0	300.0
CONC. MIXER + VIBR.	0	0	0	0	240.0	96.0	0	0	0	0	0	0	336.0
25T LORAIN CRANE	0	0	0	0	0	0	0	0	0	0	0	0	0
WELDERS W/EQUIP	0	0	0	0	0	0	0	0	0	0	0	0	0
TRUCKS	1350.0	2250.0	0	0	0	0	0	0	0	0	0	0	3600.0
MOTOR GRADER	1080.0	1260.0	450.0	450.0	800.0	320.0	0	0	0	0	0	0	4360.0
FARM-ALL + VIB ROLLE	450.0	300.0	800.0	800.0	650.0	260.0	0	0	0	0	0	0	3260.0
FRONT END LOADER	600.0	1000.0	0	0	0	0	0	0	0	0	0	0	1600.0
WATER TRUCK	0	0	800.0	800.0	0	0	0	0	0	0	0	0	1600.0
WEEKLY TOTALS	3894.0	5156.0	2277.5	2277.5	1865.0	1212.5	231.5	0	0	0	0	0	16914.0

FIGURE 3

WORK SCHEDULE FOR LABOR INTENSIVE METHOD

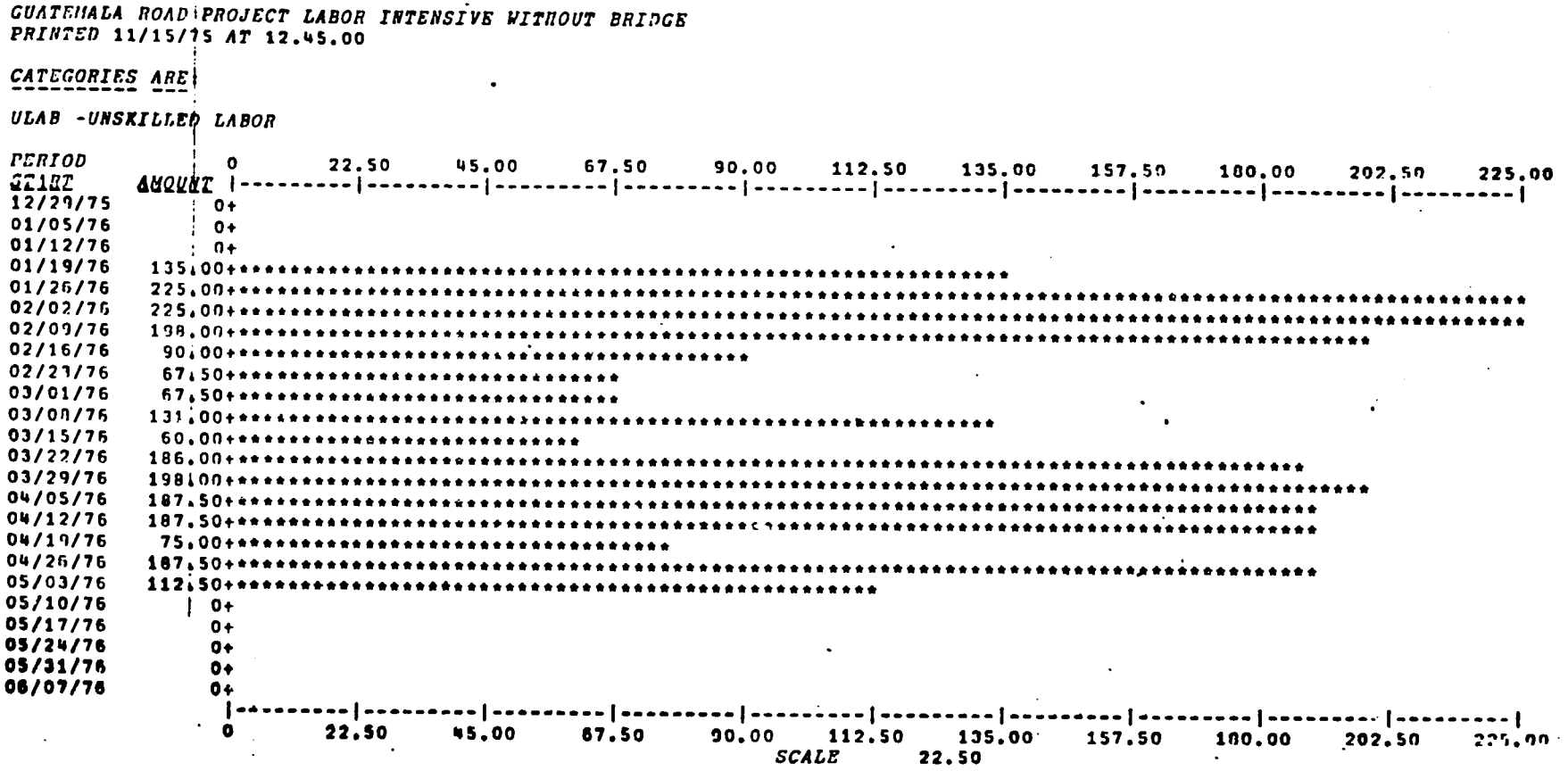


FIGURE 4

UNSKILLED LABOR REQUIREMENTS FOR LABOR INTENSIVE METHODS

WITHOUT BRIDGE - UNSKILL

WALA ROAD PROJECT LABOR INTENSIVE WITHOUT BRIDGE - UNSKILLED LABOR = 0
ED 11/17/75 AT 10.49.39

PRED	SUCC	START	FINISH	ADMN	TOOL	DSC	ULAB	SLAB	MATL	MIXR	CRNR	UPLD	TRNS	[illegible]	FNAL	FELR	WTRK
DUR		DESC															
A900	A902	01/01/76	01/21/76	2050.0	1000.0								1494.0				
14.00		MOBILIZATION (4544)															
A902	A904	01/21/76	02/11/76			3900.0											
15.00		CLEARING + GRUBBING (4															
A904	A906	02/11/76	03/10/76			5200.0		1280.0	1000.0				7500.0			3000.0	
20.00		EXCAV. + EMBANK. CONST															
A906	A908	03/10/76	03/10/76														
0		CONSTRUCT CULVERTS (13															
A904	A908	02/11/76	02/17/76					32.0	1231.0								
4.00		DRAINAGE STRUCTURES (1															
A906	A910	03/10/76	03/15/76					24.0	929.0								
3.00		FINISH EXCAV. + EMBANK															
A908	A910	03/10/76	03/24/76					400.0									
10.00		FINEGRADE ROADWAY (189															
A910	A912	03/24/76	03/31/76					120.0						900.0	750.0		
5.00		PLACE SELECT SUB-BASE															
A912	A914	03/31/76	03/31/76														
0		FINEGRADE SUB-BASE (45															
A910	A914	03/24/76	04/05/76					160.0					3600.0	1440.0		1600.0	
8.00		CONST. SHLDRS + BERMS															
A914	A916	04/05/76	04/19/76					80.0						960.0	1600.0		1600.0
10.00		ROADSIDE IMPROVEMENTS															
A916	A918	04/19/76	04/26/76					140.0		336.0				1120.0	910.0		
7.00		ERECT G-RAILS FENCES															
A918	A922	04/26/76	05/03/76					24.0									
3.00		CLEAN-UP + ACCEPTANCE															
A922	A920	05/04/76	05/07/76					24.0									
3.00		CLEAN-UP + ACCEPTANCE															
A918	A920	04/26/76	05/04/76					80.0	300.0								
4.00		ERECT G-RAILS FENCES 8															
A920	A922	05/04/76	05/04/76														
0		DUMMY A920 A922															
		TOTALS		2050.0	1000.0	9100.0	0	2444.0	3460.0	336.0	0	0	12594.0	4260.0	[illegible]	4600.0	1600.0

FIGURE. 5

COMPONENT SCHEDULE BY ACTIVITY ITEM: LABOR INTENSIVE
NOTE; UNSKILLED LABOR SHADOW WAGED AT ZERO COST

AGENCY FOR INTERNATIONAL DEVELOPMENT
FINANCIAL ANALYSIS

DATE: 9/17/75

GUATEMALA REGION III & IV -- TRANS -- $=US DOLLARS

FARM BUDGET W/PROJECT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
LAND USE H HA										
CORN1	1.30	1.30	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90
CORN2	0.0	0.50	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90
BEANS	0.0	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
CARDAMOM	0.0	0.0	0.50	0.50	0.50	1.00	1.00	1.50	1.50	1.[illegible]
GARDEN	0.20	0.20	0.20	0.20	0.40	0.40	0.40	0.40	0.40	0.[illegible]
PASTURE	0.0	0.0	0.50	1.20	1.20	1.90	1.90	1.90	1.90	1.90
TOTAL LAND IN USE	1.50	2.30	5.30	6.00	6.20	7.40	7.40	7.90	7.90	7.90
YIELD QQ /HA										
CORN1	25.0	27.5	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
CORN2	18.0	24.[illegible]	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
BEANS	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
CARDAMOM	0.0	0.0	0.0	5.0	6.0	3.0	6.0	4.0	6.0	6.0
GARDEN	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
PASTURE (AU/HA)	0.0	0.0	1.2	1.5	1.8	2.1	2.1	2.1	2.1	2.1
OUTPUT QQ										
CORN1	32.5	35.7	57.0	57.0	57.0	57.0	57.0	57.0	57.0	57.0
CORN2	0.0	12.0	57.0	57.0	57.0	57.0	57.0	57.0	57.0	57.0
BEANS	0.0	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
CARDAMOM	0.0	0.0	0.0	2.5	3.0	3.0	6.0	6.0	9.0	9.0
GARDEN	3.0	3.0	3.0	3.0	6.0	6.0	6.0	6.0	6.0	6.0
PASTURE (AU)	0.0	0.0	0.6	1.8	2.2	4.0	4.0	4.0	4.0	4.0
ON FARM LOSSES QQ										
CORN1	3.2	2.9	3.4	2.8	2.8	2.8	2.8	2.8	2.8	2.8
CORN2	0.0	1.0	3.4	2.8	2.8	2.8	2.8	2.8	2.8	2.8
BEANS	0.0	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
CARDAMOM	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
NET PRODUCTION QQ										
CORN1	29.2	32.9	53.6	54.1	54.1	54.1	54.1	54.1	54.1	54.1
CORN2	0.0	11.0	53.6	54.1	54.1	54.1	54.1	54.1	54.1	54.1
BEANS	0.0	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
CARDAMOM	0.0	0.0	0.0	2.5	3.0	3.0	5.9	5.9	8.9	8.9
GARDEN	3.0	3.0	3.0	3.0	6.0	6.0	6.0	6.0	6.0	6.0
PASTURE (AU)	0.0	0.0	0.6	1.8	2.2	4.0	4.0	4.0	4.0	4.0

EXHIBIT 12
Page 15
of 25

UNCLASSIFIED

AGENCY FOR INTERNATIONAL DEVELOPMENT
FINANCIAL ANALYSIS

DATE: 9/17/75 GUATEMALA REGION III & IV -- TRANS -- $=US DOLLARS

FARM BUDGET W/PROJECT		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
SALES FARMGATE											
CORN1											
@$ 6.80/QQ	$	198.9	223.7	364.3	368.2	368.2	368.2	368.2	368.2	368.2	368.2
CORN2											
@$ 6.80/QQ	$	0.0	75.1	364.3	368.2	368.2	368.2	368.2	368.2	368.2	368.2
BEANS											
@$ 16.15/QQ	$	0.0	52.3	52.3	52.3	52.3	52.3	52.3	52.3	52.3	52.3
CARDAMOM											
@$ 110.00/QQ	$	0.0	0.0	0.0	272.2	326.7	326.7	653.4	653.4	980.1	980.1
GARDEN											
@$ 3.50/QQ	$	10.5	10.5	10.5	10.5	21.0	21.0	21.0	21.0	21.0	21.0
PASTURE											
@$ 36.00/AU	$	0.0	0.0	21.6	64.8	77.8	143.6	143.6	143.6	143.6	143.6
GROSS SALES	$	209.4	361.5	813.1	1136.3	1214.2	1280.1	1606.8	1606.8	1933.5	1933.5
EXPENDITURES											
FAMILY LABOR W/PROJ	$	-101.0	-147.5	-319.4	-340.4	-347.4	-413.9	-413.9	-459.4	-459.4	-459.4
HIRED LABOR	$	0.0	-10.5	-39.5	-39.5	-39.5	-68.5	-68.5	-97.5	-97.5	-97.5
FENCING-LAND CLEAR	$	-3.0	-3.0	-8.0	-8.0	-11.0	-16.0	-16.0	-21.0	-21.0	-21.0
TRACTION (ANIMAL)	$	-18.0	-24.1	-38.4	-38.4	-38.4	-41.4	-41.4	-44.4	-44.4	-44.4
IMPLEMENTS	$	-1.9	-2.7	-8.2	-8.2	-8.2	-10.7	-10.7	-13.2	-13.2	-13.2
SEED PURCHASE	$	-9.2	-17.7	-31.3	-34.4	-34.9	-38.1	-38.1	-38.1	-38.1	-38.1
FERT & INSECT	$	-40.3	-55.5	-148.9	-148.9	-148.9	-204.3	-204.3	-259.7	-259.7	-259.7
TRACTION(MACHINE)	$	-28.9	-32.7	-46.0	-46.0	-46.0	-46.0	-46.0	-46.0	-46.0	-46.0
ADD. INSECT & PEST	$	-8.2	-13.7	-26.1	-26.1	-26.1	-27.7	-27.7	-29.4	-29.4	-29.4
MEDICINES	$	0.0	0.0	-2.4	-5.8	-5.8	-9.1	-9.1	-9.1	-9.1	-9.1
SUBTOTAL	$	-210.6	-307.4	-668.2	-695.8	-706.3	-875.8	-875.8	-1017.7	-1017.7	-1017.7

UNCLASSIFIED

Exhibit 12
Page 16 of 2

AGENCY FOR INTERNATIONAL DEVELOPMENT
FINANCIAL ANALYSIS

DATE: 9/17/75

GUATEMALA REGION III & IV -- TRANS -- $=US DOLLARS

FARM BUDGET W/PROJECT		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
ADD. CASH INCOME & EXP.											
PROD. CREDIT 8%	$	88.6	122.3	262.9	269.4	269.9	336.0	336.0	395.5	395.5	395.5
PROD. LOAN REPAY.	$	-92.1	-127.1	-273.4	-280.2	-280.7	-349.4	-349.4	-411.3	-411.3	-411.3
INTER. CREDIT 8%	$	149.9	-50.1	-50.1	-50.1	-50.1	0.0	0.0	0.0	0.0	0.0
PURCHASE IMPLEMENTS.	$	-39.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CLEAR LAND	$	-140.0	-150.0	0.0	0.0	0.0	-170.0	0.0	0.0	0.0	0.0
CONSTRUCT HOUSE	$	-150.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PURCHASE COW	$	0.0	0.0	-150.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FAMILY SAVINGS	$	35.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CARDAMOM SEED	$	0.0	0.0	-10.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ADDED INCOME & EXP	$	-147.9	-205.0	-221.5	-60.9	-60.9	-183.4	-13.4	-15.8	-15.8	-15.8
TOTAL FARM INCOME	$	-149.1	-150.8	-76.6	379.7	447.1	220.9	717.6	573.2	899.9	899.9
PRE-PROJECT INCOME	$	101.0	101.0	101.0	101.0	101.0	101.0	101.0	101.0	101.0	101.0
ON FARM NET BENEFIT	$	-250.1	-251.8	-177.6	278.7	346.1	119.9	616.6	472.2	798.9	798.9
RETURNS TO LABOR/MGMTS		-1.2	100.7	363.2	679.9	754.3	717.2	1043.9	947.4	1274.1	1274.1

ECONOMIC ANALYSIS

DATE: 9/17/75

GUATEMALA REGION III & IV -- TRANS -- $=US DOLLARS

ELEMENT BENEFIT W/PROJ		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
TOTAL FARM INCOME	$	-149.1	-150.8	-76.6	379.7	447.1	220.9	717.6	573.2	899.9	899.9
RESIDUAL VALUE	$	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1500.0
SHADOW PRICE ADJ											
FAMILY LABOR	$	50.5	73.7	159.7	170.2	173.7	206.9	206.9	229.7	229.7	229.7
HIRED LABOR	$	0.0	5.2	19.7	19.7	19.7	34.2	34.2	48.7	48.7	48.7
TOTAL SDW PRICE ADJ	$	50.5	79.0	179.4	189.9	193.4	241.2	241.2	278.4	278.4	278.4
NET FARM BEN. W/ADJ	$	-98.6	-71.8	102.8	569.6	640.5	462.1	958.8	851.7	1178.4	2678.4
PROJECT & ADMIN COST	$	-500.0	-500.0	-500.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NET ECONOMIC CASHFLOW A HA	$	-598.6	-571.8	-397.2	569.6	640.5	462.1	958.8	851.7	1178.4	2678.4

ON FARM NET BENEFIT

YR	NET CASH FLOW	DISCOUNT RATE0.30	DISCOUNTED CASH FLOW	DISCOUNT RATE0.35	DISCOUNTED CASH FLOW
1.	-250.	0.7692	-192.	0.7407	-185.
2.	-252.	0.5917	-149.	0.5487	-138.
3.	-178.	0.4552	-81.	0.4064	-72.
4.	279.	0.3501	98.	0.3011	84.
5.	346.	0.2693	93.	0.2230	77.
6.	120.	0.2072	25.	0.1652	20.
7.	617.	0.1594	98.	0.1224	75.
8.	472.	0.1226	58.	0.0906	43.
9.	799.	0.0943	75.	0.0671	54.
10.	799.	0.0725	58.	0.0497	40.
		PW1=	83.	PW2=	-3.

THE RATE OF RETURN IS 34.82%

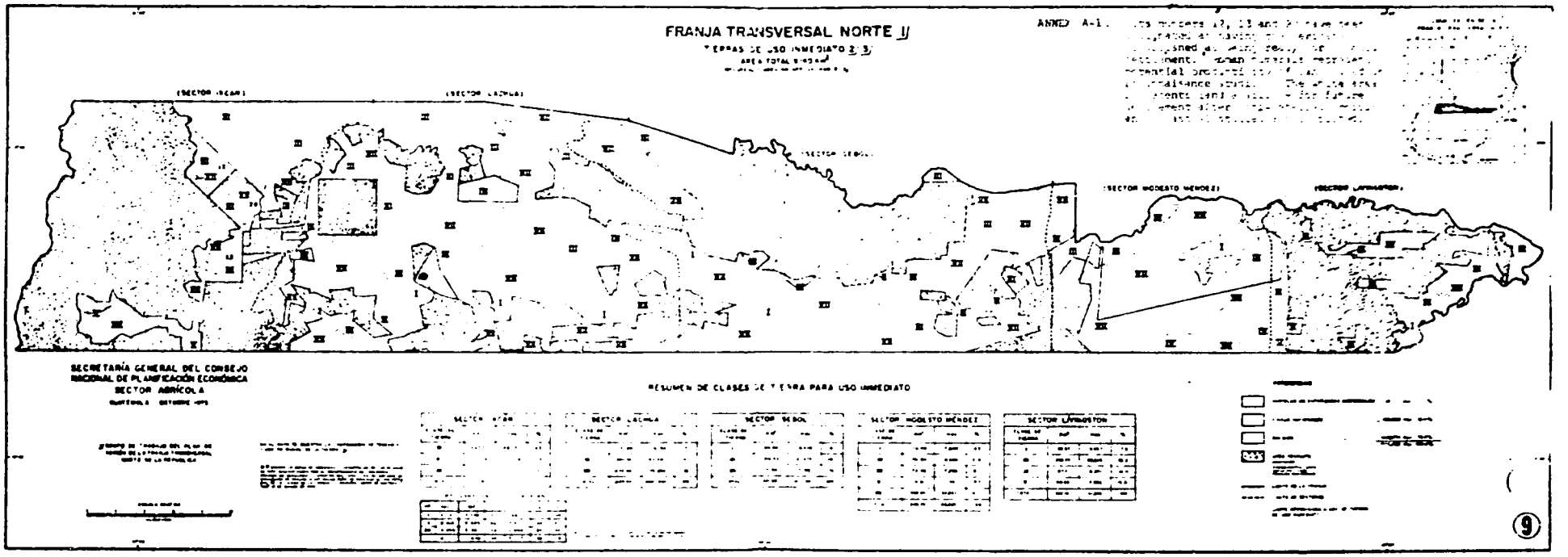
NET ECONOMIC CASHFLOW

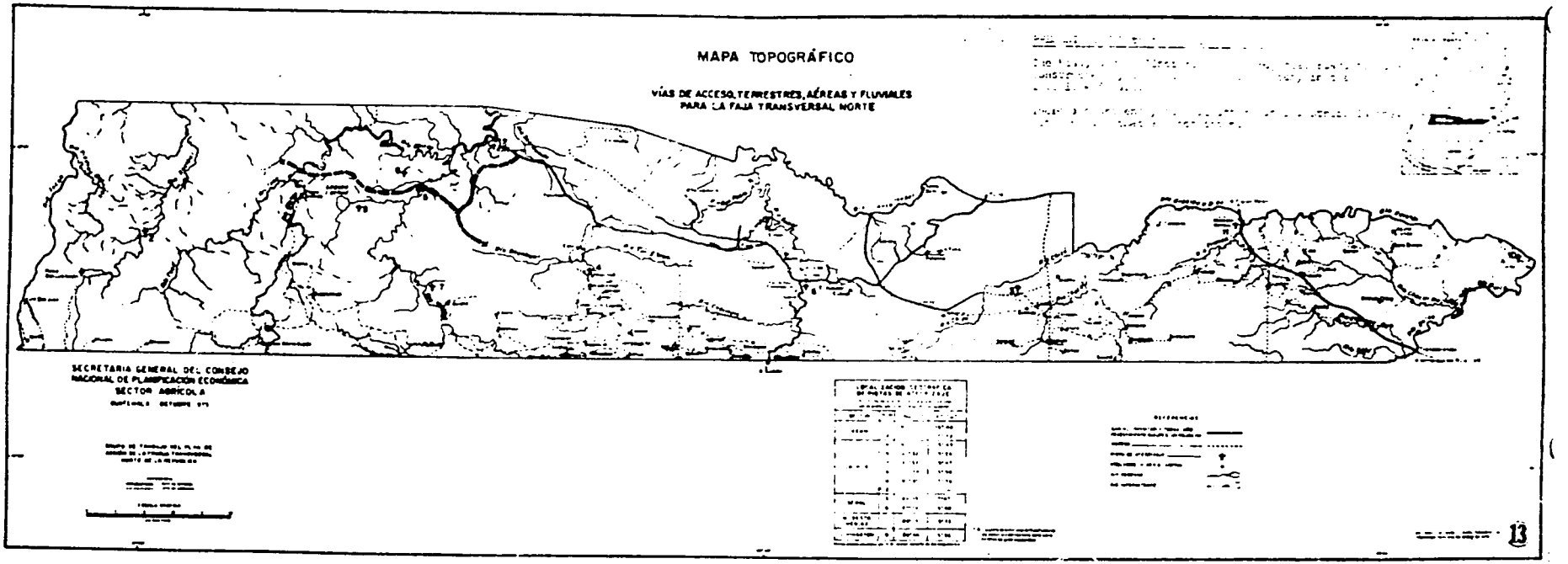
YR	NET CASH FLOW	DISCOUNT RATE0.30	DISCOUNTED CASH FLOW	DISCOUNT RATE0.35	DISCOUNTED CASH FLOW
1.	-599.	0.7692	-460.	0.7407	-443
2.	-572.	0.5917	-338.	0.5487	-314
3.	-397.	0.4552	-181.	0.4064	-161
4.	570.	0.3501	199.	0.3011	171
5.	641.	0.2693	173.	0.2230	143
6.	462.	0.2072	96.	0.1652	76
7.	959.	0.1594	153.	0.1224	117
8.	852.	0.1226	104.	0.0906	77
9.	1178.	0.0943	111.	0.0671	79
10.	2678.	0.0725	194.	0.0497	133
		PW1=	51.	PW2=	-121.

THE RATE OF RETURN IS 31.47%

RETURNS TO LABOR & MANAGEMENT

HE RATE OF RETURN IS OVER 50%


FRANJA TRANSVERSAL NORTE 1/
(SECTOR MODESTO MENDEZ)
SECRETARÍA GENERAL DEL CONSEJO NACIONAL DE PLANIFICACIÓN ECONÓMICA
SECTOR AGRÍCOLA
RESUMEN DE CLASES DE TIERRA PARA USO INMEDIATO
SECTOR LAMPIRISTON
9

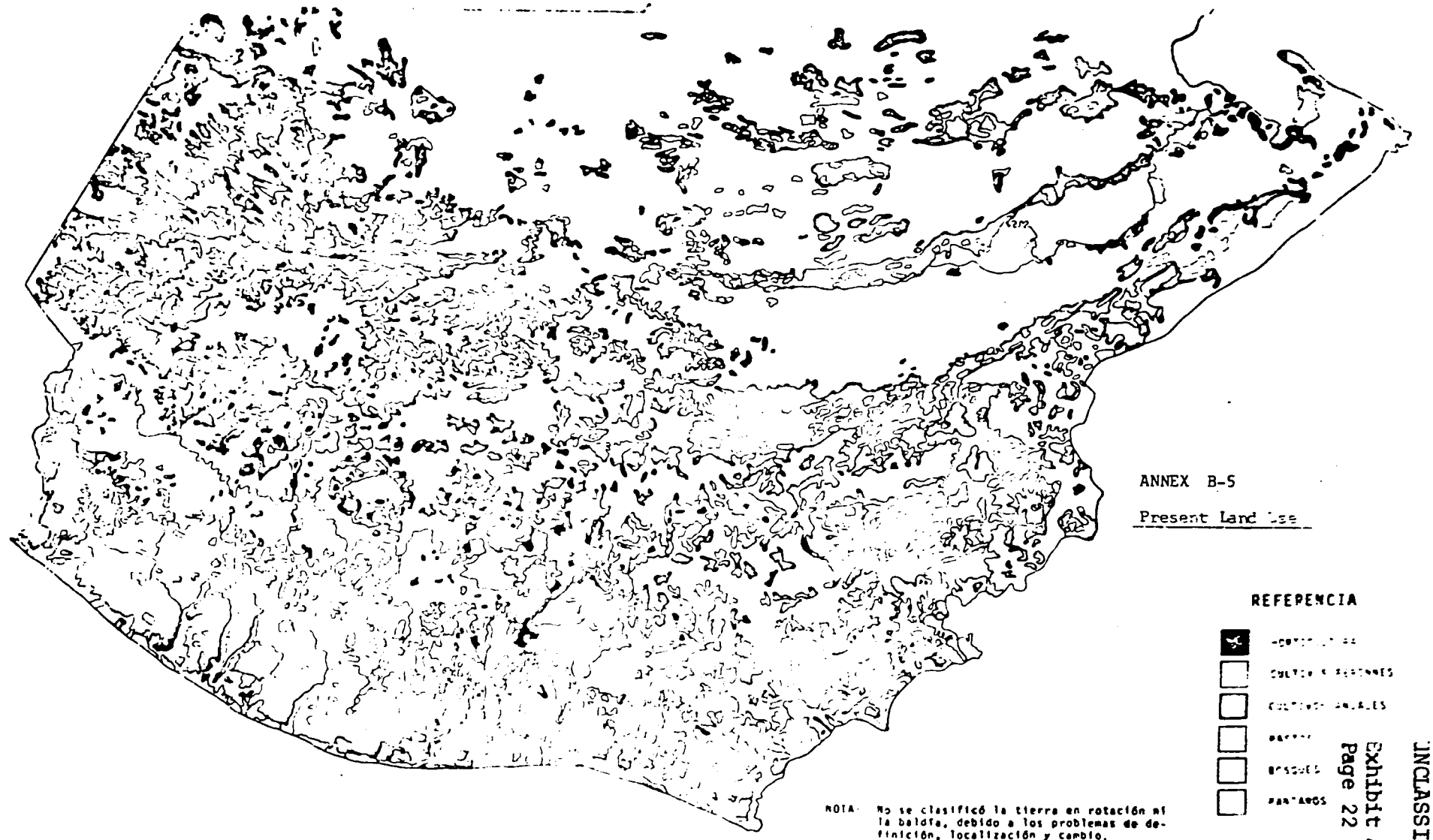


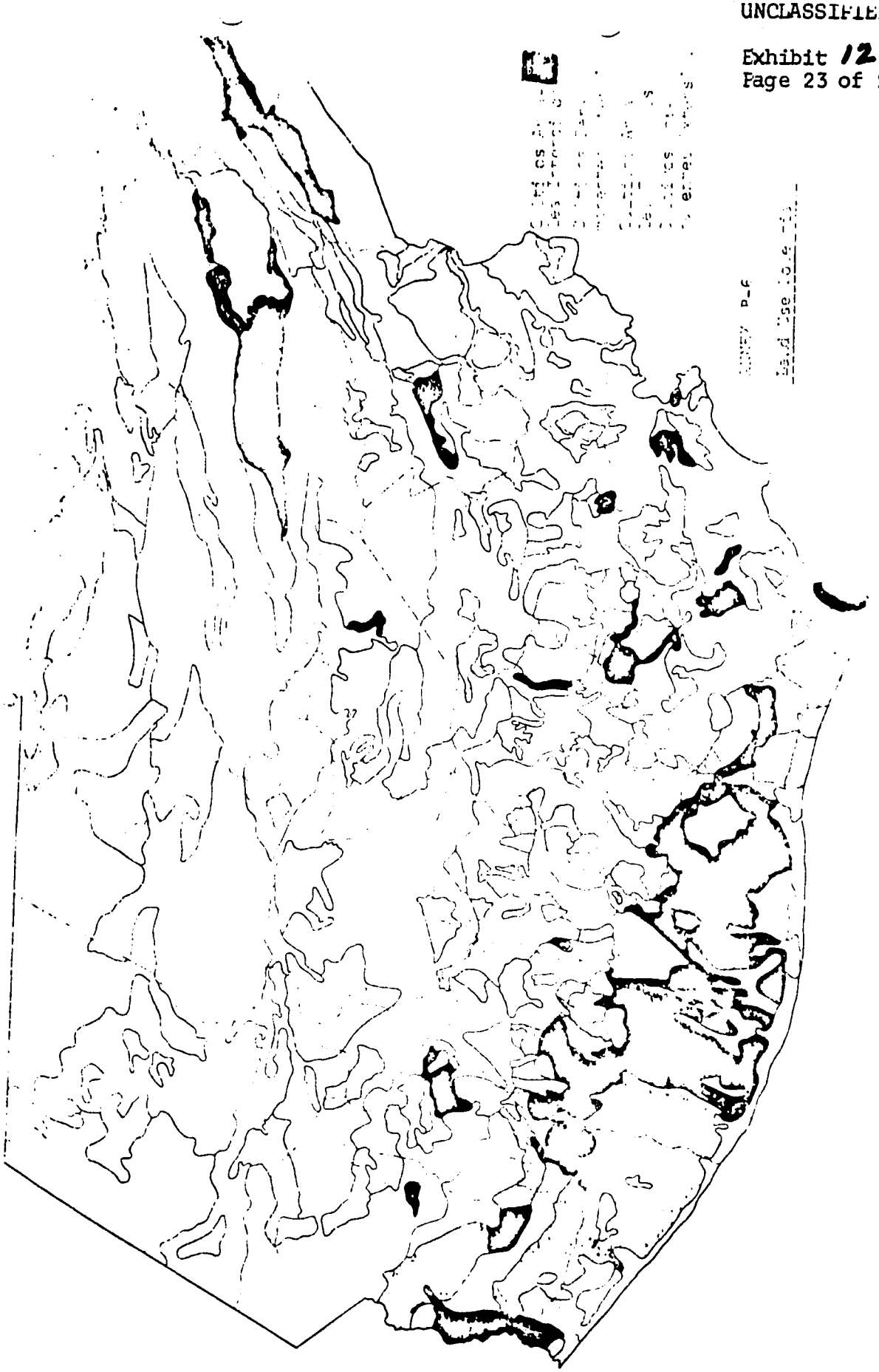
UNCLASSIFIED

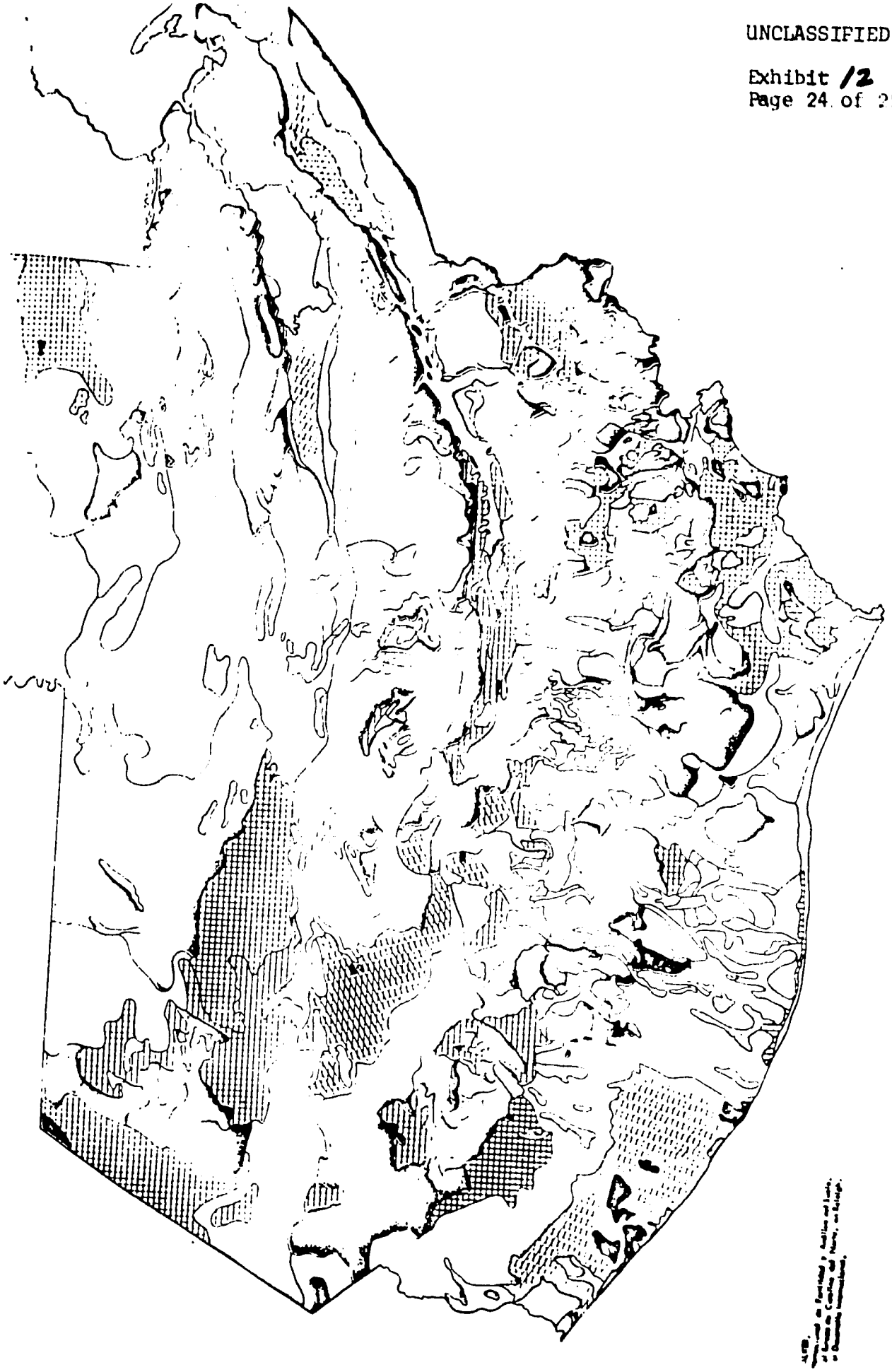
Exhibit 12

Page 20 of 25

ANNEX B-1 Population Density

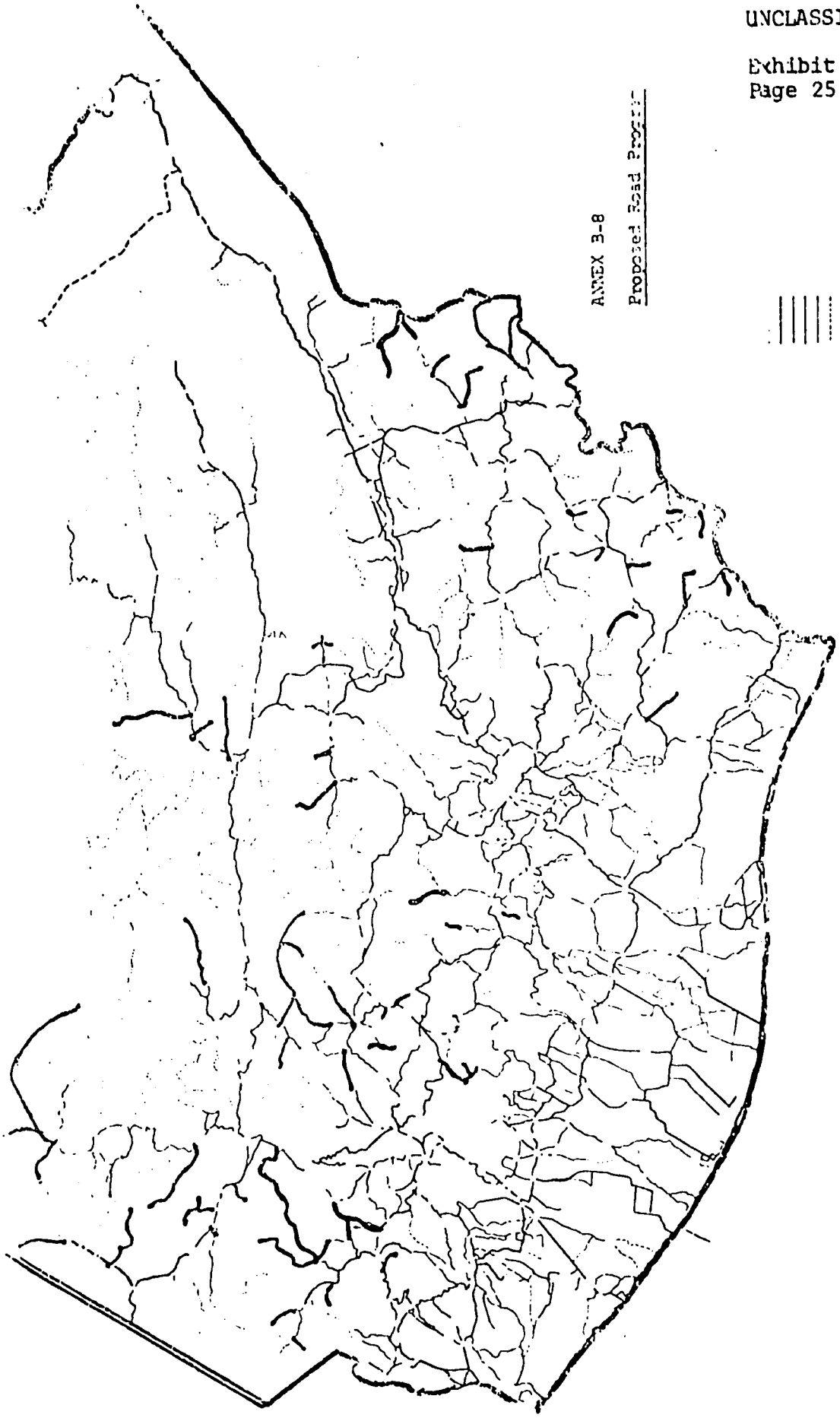

ANNEX B-5
Present Land Use
REFERENCIA
NOTA: No se clasificó la tierra en rotación ni la baldía, debido a los problemas de definición, localización y cambio.





ANNEX 3-8

Proposed Road Progr



DRAFT PROJECT DESCRIPTION

The Project consists of a coordinated program to improve the incomes of rural Guatemalans through increased on-farm productivity and the creation of alternative employment opportunities in the rural areas. The Project is expected to reach these objectives by implementing the following activities to help small farmers and the rural landless poor:

1. Increasing the productive capacity of small farmer land resources through the construction of small scale irrigation works and the introduction of soil conservation and watershed management practices.

2. Opening new lands in the Northern Transversal Strip for the settlement of 5,000 families by small farmer cooperative organizations and development of the information and plans for continuing the program to the balance of the area.

3. Expanding the rural transportation network by improving approximately 280 kilometers of minimum standard farm-to-market access roads using labor itensive construction methods.

4. Strengthening the sector planning unit within the Ministry of Agriculture as well as the capacity of public agricultural sector organizations to implement coordinated programming and delivery of improved services and technical assistance to small farmers.

Goods and services eligible for financing with loan funds under the Project are generally described below:

A. Land Resources Improvements - technical assistance teams, vehicles, tools, equipment and an intermediate credit fund for financing small irrigation systems and related land resource improvements.

B. New Lands Settlement - Credit to the GOG for use in making loans and grants to selected cooperatives to defray the costs of settling approximately 5000 families in the Northern Transversal Strip. These funds will be used to finance transportation and community infrastructure, meet the credit needs of the settlers and provide operating

capital during the initial years of operation.

C. Access Road Construction - construction equipment, services and materials to carry out labor intensive road construction projects.

D. Human Resources - technical assistnece, personnel and services essential for strengthening the capacity of the Sector Planning Unit and conducting the pre- and in-service training program (scholarship training abroad, teaching materials, equipment, and supplies, etc.)

The Project activities will be carried out primarily in the Western Highlands, Eastern and Northern Lowlands regions of the country. The total cost of the Loan project is estimated at $20,909,000 of which $13,000,000 will be financed with loan funds disbursed over the five year life of the project. The Government of Guatemala will contribute a minimum of $5,385,000 in new budgetary resources and at least the equivalent of $1,909,000 in administrative and organizational support to the program over the life of the Project.

CHECKLIST OF STATUTORY CRITERIA

In the right-hand margin, for each item, write answer or, as appropriate, a summary of required discussion. As necessary, reference the section(s) of the Capital Assistance Paper, or other clearly identified and available document, in which the matter is further discussed. This form may be made a part of the Capital Assistance Paper.

The following abbreviations are used:

FAA - Foreign Assistance Act of 1961, as amended.

FAA, 1973 - Foreign Assistance Act of 1973.

App. - Foreign Assistance and Related Programs Appropriation Act, 1974.

MMA - Merchant Marine Act of 1936, as amended.

BASIC AUTHORITY

1. FAA § 103; § 104; § 105; § 106; § 107. Is loan being made:

a. for agriculture, rural development or nutrition;

This loan is to support the GOG's programs to accelerate rural agricultural development. The project will finance improvements in small farmer land resources, rural access roads, land settlement and human resources development.

b. for population planning or health;

c. for education, public administration, or human resources development;

d. to solve economic and social development problems in fields such as transportation, power, industry, urban development, and export development;

e. in support of the general economy of the recipient country or for development programs conducted by private or international organizations.

COUNTRY PERFORMANCE

Progress Towards Country Goals

2. FAA § 201 (b) (5), (7) & (8); § 208

A. Describe extent to which country is:

(1) Making appropriate efforts to increase food production and improve means for food storage and distribution.

The Government of Guatemala is now implementing several new programs to increase food production and improve storage facilities and internal distr bution. GOG projects in agricultural research, farmer credit and cooperati grain research, farmer credit and co-operating grain storage and processin are being supported with AID Loan Fun

(2) Creating a favorable climate for foreign and domestic private enterprise and investment.

Participation of the GOG in the AID Guaranty Program and implementation c two private financieras (FIASA) demon strate the GOG's support for foreign and domestic private enterprise and investment.

(3) Increasing the public's role in the developmental process.

The GOG is implementing several programs (rural primary education, farmer cooperatives, municipal development, et which will improve the individual anc collective skill of the campesinos tc participate in the overall developmer process.

(4) (a) Allocating available budgetary resources to development.	The GOG is allocating a significant portion of its national budget to activities related to development. Additional emphasis is being placed by the GOG on the accelerating development of the rural population.
(b) Diverting such resources for unnecessary military expenditure (See also Item No. 20) and intervention in affairs of other free and independent nations.) (See also Item No. 11).	The Government of Guatemala does not appear to be diverting resources for unnecessary military expenditures, nor are they intervening in the affairs of other free and independent nations.
(5) Making economic, social, and political reforms such as tax collection improvements and changes in land tenure arrangements, and making progress toward respect for the rule of law, freedom of expression and of the press, and recognizing the importance of individual freedom, initiative, and private enterprise.	With the assistance of two AID Loans the GOG is making substantial improvements on the collection of tax revenues and is initiating a commission to improve land tenure in the rural areas. The GOG is supporting several programs which recognize the importance of individual freedom, initiative and private enterprise. Guatemala is considered to have a free press.
(6) Willing to contribute funds to the project or program.	The Mission has held discussions with GOG personnel from the National Planning Council and the Ministries of Agriculture and Communications/ Public Works concerning the GOG counterpart contributions to the project. They and the Ministry of Finance, agree on the scope of the project and the level of investment needed.
(7) Otherwise responding to the vital economic, political, and social concerns of its people, and demonstrating a clear determination to take effective self-help measures.	GOG efforts in this respect are described at length in Parts 2 and 3 of the PP.
B. Are above factors taken into account in the furnishing of the subject assistance?	All of the above factors have been taken into account in the furnishing of assistance for this program.

Treatment of U.S. Citizens and Firms.

3. FAA § 620 (c). If assistance is to government, is the government liable as debtor or unconditional guarantor on any debt to a U.S. citizen for goods or services furnished or ordered where (a) such citizen has exhausted available legal remedies and (b) debt is not denied or contested by such government?

The Borrower is not known to be indebted to any U. S. citizen in any such manner.

4. FAA § 620 (e) (1). If assistance is to a government, has it (including government agencies or subdivisions) taken any action which has the effect of nationalizing, expropriating, or otherwise seizing ownership or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities?

The GOG (including Government agencies and subdivisions) has not taken any such actions since 1962.

5. FAA § 620 (o); Fishermen's Protective Act. § 5. If country has seized, or imposed any penalty or sanction against any U.S. fishing vessel on account of its fishing activities in international waters.

The GOG not seized, or imposed penalties or sanctions against any U.S. fishing vessels on account of its fishing activities in international waters.

a. has any deduction required by Fishermen's Protective Act been made?

No.

AID 1240-1 (6-74)

b. has complete denial of assistance been considered by A.I.D. Administrator?	No.

Relations with U.S. Government and Other Nations

6. FAA § 620 (a). Does recipient country furnish assistance to Cuba or fail to take appropriate steps to prevent ships or aircraft under its flag from carrying cargoes to or from Cuba?	The GOG does not furnish assistance to Cuba or fail to take appropriate steps to prevent ships or aircraft under its flag from carrying cargoes to or from Cuba.
7. FAA § 620 (b). If assistance is to a government, has the Secretary of State determined that it is not controlled by the international Communist movement?	The Secretary of State has determined that Guatemala is not controlled by the international Communist movement.
8. FAA § 620 (d). If assistance is for any productive enterprise which will compete in the United States with United States enterprise, is there an agreement by the recipient country to prevent export to the United States of more than 20% of the enterprise's annual production during the life of the loan?	This Loan is not for a productive enterprise.
9. FAA § 620 (f). Is recipient country a Communist country?	Guatemala is not a Communist country

10. FAA § 620 (i). Is recipient country in any way involved in (a) subversion of, or military aggression against, the United States or any country receiving U.S. assistance, or (b) the planning of such subversion or aggression?	The President has determined that Guatemala is not engaging in or preparing for any such activities.
11. FAA § 620 (j). Has the country permitted, or failed to take adequate measures to prevent, the damage or destruction, by mob action, of U.S. property?	Guatemala does not permit and has taken adequate measures to prevent such damage and destruction.
12. FAA § 620 (l). If the country has failed to institute the investment guaranty program for the specific risks of expropriation, inconvertibility or confiscation, has the A.I.D. administration within the past year considered denying assistance to such government for this reason?	The GOG has initiated the investment guaranty program.
13. FAA § 620 (n). Does recipient country furnish goods to North Viet-Nam or permit ships or aircraft under its flag to carry cargoes to or from North Viet-Nam?	The GOG does not furnish goods or permit traffic with North Vietnam.
14. FAA § 620 (q). Is the government of the recipient country in default on interest or principal of any A.I.D. loan to the country?	The GOG has not defaulted on any AID Loan.

15. FAA § 620 (t). Has the country severed diplomatic relations with the United States? If so, have they been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption?

Guatemala has maintained di[illegible] relations with the United S[illegible]

16. FAA § 620 (u). What is the payment status of the country's U.N. obligations? If the country is in arrears, were such arrearages taken into account by the A.I.D. Administrator in determining the current A.I.D. Operational Year Budget?

We have been advised that Guatemala is not delinquent on its U.N. obligations.

17. FAA § 481. Has the government of recipient country failed to take adequate steps to prevent narcotics drugs and other controlled substances (as defined by the Comprehensive Drug Abuse Prevention and Control Act of 1970) produced or processed, in whole or in part, in such country, or transported through such country, from being sold illegally within the jurisdiction of such country to U.S. Government personnel or their dependents, or from entering the U.S. unlawfully?

The Government of Guatemala is taking adequate steps to prevent the production, processing and trafficking of narcotic drugs and other controlled substances (as defined by the Comprehensive Drug Abuse Prevention and Control Act of 1970).

18. FAA. 1973 § 29. If (a) military base is located in recipient country, and was constructed or is being maintained or operated with funds furnished by U.S., and (b) U.S. personnel carry out military operations from such base, has the President determined that the government of recipient country has authorized regular access to U.S. correspondents to such base?

There are no U.S. military bases located in Guatemala.

Military Expenditures

19. FAA s 620 (s). What percentage of country budget is for military expenditures? How much of foreign exchange resources spent on military equipment? How much spent for the purchase of sophisticated weapons systems? (Consideration of these points is to be coordinated with the Bureau for Program and Policy Coordination, Regional Coordinators and Military Assistance Staff (PPC/RC).)

6.6 percent of the current national budget is devoted to military expenses. Of this amount, $1[illegible]3,000 of foreign exchange is to be spent on military equipment. No funds are budgeted for the purchase of sophisticated weapons systems.

Conditions of The Loan

General Soundness

20. FAA s 201 (d). Information and conclusion on reasonableness and legality (under laws of country and the United States) of lending and relending terms of the loan.

The proposed Loan is legal under the laws of Guatemala and the U.S. and its terms are reasonable for Guatemala at this time.

21. FAA s 201 (b) (2); s 201 (e) Information and conclusion on on activity's economic and technical soundness. If loan is not made pursuant to a multilateral plan, and the amount of the loan exceeds $100,000, has country submitted to A.I.D. an application for such funds together with assurances to indicate that funds will be used in an economically and technically sound manner?

The activity has been found economically and technically sound. A formal application was received on December , 1975 (see Annex H). Satisfactory assurances have been received that Loan funds will be used in an economically and technically sound manner

22. FAA s 201 (b) (2). Information and conclusion on capacity of the country to repay the loan, including reasonableness of repayment prospects.

It appears reasonably certain that Guatemala will repay the Loan. The country's foreign exchange position warrants the conclusion that dollars will be available as needed for repayment of this Loan.

23. FAA s 201 (b) (1). Information and conclusion on availability of financing from other free-world sources, including private sources within the United States.	Financing for this activity is not available from other free-world sources, including private sources within the U. S.
24. FAA s 611 (a) (1). Prior to signing of loan will there be (a) engineering, financial, and other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the United States of the assistance?	Necessary engineering, financial and other plans, and a reasonably firm estimate of the cost to the U.S. of this activity will be developed prior to signing of the Loan Agreement.
25. FAA s 611 (a) (2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of loan?	On the basis of previous good performance by the GOG and the controls to be built into the Loan Agreement, including annual review of Project progress, it is enticipated that Borrower will carry out its required budget actions so as to permit orderly accomplishments of the purposes of the Loan.
26. FAA s 611 (c). If loan is for Capital Assistance, and all U.S. assistance to project now exceeds $1 million; has Mission Director certified the country's capability effectively to maintain and utilize the project?	The program to be financed by this Loan is a combination of capital and technical assistance. The Mission Director's certification of the country's capability to carry out and maintain the project appears in Annex G.
Loan's Relationship to Achievement of Country and Regional Goals	
27. FAA s 207; s 113 Extent to which assistance reflects appropriate emphasis on; (a) encouraging development of democratic, economic, political, and social institutions; (b) self-help in meeting the country's food needs; (c) improving availability of trained manpower in the country; (d) programs designed to meet the country's health needs.	(a) The support which this program will give to isolated villages by way of access roads, the combined small irrigation/conservation subprojects and the new lands settlement proposal using coops will all contribute towards encouraging and developing local economic, political and social institutions. (b) The land resources improvements, settlement of new lands and improved market access will contribute towards satisfying Guatemala's food needs. (c) The human resources element of the project will improve and expand the trained manpower available for

(c) other important areas of economic, political, and social development, including industry; free labor unions, cooperatives, and Voluntary Agencies; transportation and communication; planning and public administration; urban development, and modernization of existing laws; or (f) integrating women into the recipient country's national economy.

the country's rural development programs.
(d) Improving rural access and expanding the capacity to raise nutritionally superior diversified food crops will help Guatemala meet its health needs.
(e) The proposed labor-intensive rural access road construction will improve transport and communications in the rural areas.
(f) The implementation of this progra will support the integration of women in development as discussed in Part 3

28. FAA § 209. Is project susceptible of execution as part of regional project? If so why is project not so executed?

This project is not appropriate for execution as a regional project.

29. FAA § 201 (b) (4). Information and conclusion on activity's relationship to, and consistency with, other development activities, and its contribution to realizable long-range objectives.

This project is consistent with the balance of the host country's develo ment plan and the AID program, and its execution is essential to the realization of long-range developmen objectives.

30. FAA § 201 (b) (9). Information and conclusion on whether or not the activity to be financed will contribute to the achievement of self-sustaining growth.

Insofar as an improvement in the basic rural education structure in Gua temala is essential to economic development, this project will contribu to the achievement of self-sustainin growth.

31. FAA § 209: Information and conclusion whether assistance will encourage regional development programs.

To the extent this program increases production and market communcations, it will support the growth of regior al trade and development.

32. FAA s 111. Discuss the extent to which the loan will strengthen the participation of urban and rural poor in their country's development, and will assist in the development of cooperatives which will enable and encourage greater numbers of poor people to help themselves toward a better life.

This project will directly benefit the rural poor by (1) providing employment and road access to the most needy and (2) opening new lands for small farmers using their coop organizations for guidance and support.

33. FAA s 201 (f). If this is a project loan, describe how such project will promote the country's economic development taking into account the country's human and material resources requirements and relationship between ultimate objectives of the project and overall economic development.

This project is a combination of capital and technical assistance and will help the country's economic development by improving rural infrastructure and available land resources and expanding the operating capacity of the public agricultural sector.

34. FAA s 281 (a). Describe extent to which the loan will contribute to the objective of assuring maximum participation in the task of economic development on the part of the people of the country, through the encouragement of democratic, private and local governmental institutions.

The small irrigation and access roads elements of the project will enable increased participation by farmers' groups and coop units in local development activities. The coops will also participate extensively in the land settlement project.

35. FAA s 281 (b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civic education and training in skills required for effective participation in governmental and political processes essential to self-government.

The program will address the most prominently expressed needs of the rural poor: market access and assistance to increase farm unit productivity through soil conservation and irrigation. By utilizing and supporting coop organizations, the program will encourage rural institutional development.

36. FAA § 201 (b) (3). In what ways does the activity give reasonable promise of contributing to the development of economic resources, or to the increase of productive capacities?

The program will increase product ... capacities by making soil and water resources improvements on existing lands and opening up new lands for cultivation.

37. FAA § 601 (a). Information and conclusions whether loan will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.

The program should directly and indirectly complement these activities by expanding farmer productivity, transportation infrastructure and the involvement of farmers' groups and coops.

38. FAA § 619. If assistance is for newly independent country, is it furnished through multilateral organizations or plans to the maximum extent appropriate?

Guatemala is not a newly independent country.

Loan's Effect on U.S. and A.I.D. Program

39. FAA § 201 (b) (6). Information and conclusion on possible effects of loan on U.S. economy, with special reference to areas of substantial labor surplus, and extent to which U.S. commodities

This project will have no forseeable adverse effects on the U.S. economy or areas of labor surplus. Assistance will be furnished in a manner consistent with improving the U.S. balance of payments position. (See Section 4.D.3

and assistance are furnished in a manner consistent with improving the U.S. balance of payments position.

40. FAA § 202 (a). Total amount of money under loan which is going directly to private enterprise, is going to intermediate credit institutions or other borrowers for use by private enterprise, is being used to finance imports from private sources, or is otherwise being used to finance procurements from private sources.

The funds provided under this Loan will not be used directly by private enterprise or intermediate credit institutions.

41. FAA § 601 (b). Information and conclusion on how the loan will encourage U.S. private trade and investment abroad and how it will encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).

U.S. private trade and investment abroad will be indirectly benefitted through increased demand for goods and services needed to implement the project.

42. FAA § 601 (d). If a capital project, are engineering and professional services of U.S. firms and their affiliates used to the maximum extent consistent with the national interest?

This project is a combination of capital and technical assistance. However, services of U.S. professional firms will be utilized to the maximum extent practicable. Procurement of engineering and consultant services financed under the Loan will be limited to the Code 941 countries and the Central American Common Market.

43. FAA § 602. Information and conclusion whether U.S. small business will participate equitably in the furnishing of goods and service financed by the loan.

Through advertisement of proposed procurement in the Commerce Business Daily as specified in the A.I.D.Capital Projects Guidelines, U.S. small business will be permitted to participate equitably in the furnishings of Project goods and services.

44. FAA § 620 (h). Will the loan promote or assist the foreign aid projects or activities of the Communist-Bloc countries?

The Loan will not promote or assist foreign aid projects or activities of the Communist Bloc countries.

45. FAA § 621. If Technical Assistance is financed by the loan, information and conclusion whether such assistance will be furnished to the fullest extent practicable as goods and professional and other services from private enterprise on a contract basis. If the facilities of other Federal agencies will be utilized, information and conclusion on whether they are particularly suitable, are not competitive with private enterprise, and can be made available without undue interference with domestic programs.

The Loan will finance the procurement of goods and services from private enterprise on a contract basis.

Loan's Compliance with Specific Requirements

46. FAA § 110 (a); § 208 (e). In what manner has or will the recipient country provide assurances that it will provide at least 25% of the costs of the program, project, or activity with respect to which the Loan is to be made?

The GOG has given us assusrance that it will provide 37 percent of the cost of the project during the Loan implementation period.

47. FAA § 112. Will loan be used to finance police training or related program in recipient country?	The Loan will not be used to finance police training.
48. FAA § 114. Will loan be used to pay for performance of abortions or to motivate or coerce persons to practice abortions?	The Loan will not be used to pay for the performance of abortions or to motivate or coerce persons to practice abortions.
49. FAA § 201 (b). Is the country among the 20 countries in which development loan funds may be used to make loans in this fiscal year?	Yes.
50. FAA § 201 (d). Is interest rate of loan at least 2% per annum during grace period and at least 3% per annum thereafter?	Yes.
51. FAA § 201 (f). If this is a project loan, what provisions have been made for appropriate participation by the recipient country's private enterprise?	Private enterprise is expected to participate in the project through the provision of commodities and construction services.
52. FAA § 604 (a). Will all commodity procurement financed under the loan be from the United States except as otherwise determined by the President?	Commodity procurement will be limited to Code 941 countries to include CACM countries.

53. FAA § 604 (b). What provision is made to prevent financing commodity procurement in bulk at prices higher than adjusted U.S. market price?

No bulk commodity procurement is contemplated under this Loan.

54. FAA § 604 (d). If the cooperating country discriminates against U.S. marine insurance companies, will loan agreement require that marine insurance be placed in the United States on commodities financed by the loan?

The Loan Agreement will require compliance with this provision.

55. FAA § 604 (e). If offshore procurement of agricultural commodity or product is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity?

Such a provision will be included in the Implementation Letters.

56. FAA § 604 (f). If loan finances a commodity import program, will arrangements be made for supplier certification to A.I.D. and A.I.D. approval of commodity as eligible and suitable?

This Loan is not a program type Loan. Nevertheless, AID will confirm that the commodities financed by the Loan are suitable for the project and eligible for AID financing.

57. FAA § 608 (a). Information on measures to be taken to utilize U.S. Government excess personal property in lieu of the procurement of new items.

The Loan Agreement will so require.

58. FAA s 611 (b); App. s 101. If loan finances water or water-related land resource construction project or program, is there a benefit-cost computation made, insofar as practicable, in accordance with the procedures set forth in the Memorandum of the President dated May 15, 1962?

Benefit/cost computations will be made on the access roads and small irrigation projects, to the extent practicable, in accordance with the referred memorandum.

59. FAA s 611 (c). If contracts for construction are to be financed what provision will be made that they be let on a competitive basis to maximum extent practicable?

Construction contracts will be let on a competitive basis to the maximum extent practicable.

60. FAA s 612 (b); s 636(h). Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the United States are utilized to meet the cost of contractual and other services.

Guatemala is providing a substantial contribution to the project in local currency. See Project Paper, Part J, Financial Plan. No U.S.-owned foreign currencies are available for utilization in this project.

61. App. s 113. Will any of loan funds be used to pay expenses of recipient country from non-U.S. Treasury sources when excess currency of that country is on deposit in U.S. Treasury?

No.

62. FAA s 612 (d). Does the United States own excess foreign currency and, if so, what arrangements have been made for its release?

The U.S. does not now own excess local currency which could be applied to this project.

240-1 76-781

63. FAA s 620 (g). What provision is there against use of subject assistance to compensate owners for expropriated or nationalized property?

Will be complied with. [illegible] Loan Agreement will preclude [illegible] of Loan funds.

64. FAA s 620 (k). If construction of productive enterprise, will aggregate value of assistance to be furnished by the United States exceed $100 million?

This Loan will not involve construction of a productive enterprise, and will not exceed $100 million.

65. FAA s 636 (i). Will any loan funds be used to finance purchase, long-term lease, or exchange of motor vehicle manufactured outside the United States or any guaranty of such transaction?

No non-U.S. manufactured motor vehi[illegible] will be so financed under the Loan.

66. App. s 103. Will any loan funds be used to pay pensions, etc., for military personnel?

The Loan Agreement will preclude su[illegible] use of Loan funds.

67. App. s 105. If loan is for capital project, is there provision for A.I.D. approval of all contractors and contract terms?

A.I.D. will approve firms providing services for the project and financ[illegible] under the Loan, and the terms of an[illegible] contracts under which such services are provided.

68. App. s 107. Will any loan funds be used to pay UN assessments?

The Loan Agreement will preclude su[illegible] use of Loan funds.

69. App. s 109. Compliance with regulations on employment of U.S. and local personnel. (A.I.D. Regulation 7).	Will be complied with.
70. App. s 110. Will any of loan funds be used to carry out provisions of FAA s s 209 (d)?	No.
71. App. s 114. Describe how the Committee on Appropriations of the Senate and House have been or will be notified concerning the activity, program, project, country, or other operation to be financed by the Loan.	Subject Loan was included in the FY 1976 Congressional Presentation.
72. App. s 601. Will any loan funds be used for publicity or propaganda purposes within the United States not authorized by Congress?	No Loan funds will be used for publicity or propaganda purposes in the U. S.
73. [illegible] to be FAA s 640 C.	
(a) Compliance with requirement that at least 50 per centum of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed with funds made available under this loan shall be transported on privately owned U.S.-flag commercial vessels to the extent that such vessels are available at fair and reasonable rates.	The Loan Agreement will require the Borrower comply with this provision.
(b) Will grant be made to loan recipient to pay all or any portion of such differential as may exist between U.S. and foreign-flag vessel rates?	Yes, in accordance with Section [illegible] of AID Handbook No. 15, provided made avilable by AID/W.

74. Section 30 and 31 of PL 93-189 (FAA of 1973). Will any part of the loan be used to finance directly or indirectly military or paramilitary operations by the U.S. or by foreign forces in or over Laos, Cambodia, North Vietnam, South Vietnam, or Thailand? — No.

75. Section 37 of PL 93-189 (FAA of 1973); App. s. 111. Will any part of this loan be used to aid or assist generally or in the reconstruction of North Vietnam? — No.

76. App. s 112. Will any of the funds appropriated or local currencies generated as a result of AID assistance be used for support of police or prison construction and administration in South Vietnam or for support of police training of South Vietnamese? — No.

77. App. s 604. Will any of the funds appropriated for this project be used to furnish petroleum fuels produced in the continental United States to Southeast Asia for use by non-U.S. nationals? — No.