PD-AAF-904 (2)

511 0050 085791

~~NOT ON MASTER LIST~~

RECORD COPY

UNCLASSIFIED

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

CAPITAL ASSISTANCE PAPER

Proposal and Recommendations
For the Review of the
Development Loan Committee

BOLIVIA - SUB-TROPICAL LANDS DEVELOPMENT

BEST AVAILABLE

AID-DLC/P-2034

UNCLASSIFIED

RECORD COPY

5110050
PPAAF-904
①

****
*5110050 BOLIVIA *
* SUB-TROPICAL LANDS DEVELOPMENT *
* FY74 TO FY80 *
****

PROJECT SUMMARY DESCRIPTION

Loan is provided to the Government of Bolivia to encourage campesino migration to underutilized arable lands in the Bolivian Oriente by the provision of basic and agricultural infrastructure. The GOB executing agency will be the Instituto Nacional de Colonizacion (INC). This project will be limited to the colonization of two sub-areas within the Oriente, the Chane/Piray and San Julian areas. USAID participation is limited to the provision of the loan. Loan funds will be used to construct penetration roads, including 180 kms of all-weather road and 800 kms of dry-weather access trails; and to establish production support services, such as one agricultural service center for each of the subareas and agricultural credit arrangements. Among the social services to be provided are rudimentary community water systems, a sanitary post and mobile health unit, and a short-term orientation for new settlers in these subareas. In addition, loan funds will be used to provide administrative support and technical assistance to INC and for a land resource study to identify other areas suitable for intensive agricultural settlement.

Participating in the project with INC will be nine other Bolivian public and private organizations. The GOB will provide the salaries of project support personnel, 200,000 hectares of agricultural land, and will pay for the operation of the heavy equipment to be purchased for trail construction. The project will result in the migration of 5,000 families from the highland to the target areas, each with an estimated increase of $575 in net annual family income or production within five years of their arrival, assuming static production technologies. At the same time, the net family incomes of 6,000 families already in these areas are expected to increase by an estimated $483 within five years after the penetration roads are completed. The net result of increased migration and market access will be an increase, after five years, of $5.2 million in GNP, affecting 11,000 campesino families. Also, the GOB will have developed a process which can be replicated to develop other underutilized lands in the Oriente.

DESCRIPTORS

AGR DEV STRATGY	AGR EXTENSION	LAND DEVEL	FARM MKT ROAD
LAND REFORM	MIGRATION	FARM INCOME	INCOME DIST
RURAL DEVEL	RURAL ROADS	FEEDER ROADS	PENETRATN ROAD
SMALL FARM CNTR	WELLS	POTABLE WATER	RURAL HEALTH
HEALTH POST	MOBIL HLTH SERV	RUR HLTH SRVC	LAND SURVEY
FARMER TRAINING	INSTIT BUILDING		

SUB-PROJECT NUMBER: 00 BATCH NUMBER: 98

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

UNCLASSIFIED

AID-DLC/P-2034

May 28, 1974

MEMORANDUM FOR THE DEVELOPMENT LOAN COMMITTEE

SUBJECT: Bolivia - Sub-Tropical Lands Development

Attached for your review are the recommendations for authorization of a loan in an amount not to exceed Nine Million Seven Hundred Thousand United States Dollars ($9,700,000 to the Government of Bolivia ("Borrower") to assist the Borrower in financing the United States dollar and local currency costs of a land settlement project in the Bolivian Oriente, ("Project").

This loan proposal is scheduled for consideration by the Development Loan Staff Committee on Friday, May 31, 1974. Please note your concurrence or objection is due at the close of the meeting. If you are a voting member a poll sheet has been enclosed for your response. Please bring your poll sheet to the meeting with you.

Development Loan Committee
Office of Development
Program Review

ATTACHMENTS:

Summary and Recommendations
Project Analysis
ANNEXES I - VI

UNCLASSIFIED

UNCLASSIFIED
AID-DLC/P-2034

May 28, 1974

BOLIVIA - SUB-TROPICAL LANDS DEVELOPMENT

TABLE OF CONTENTS

		Page
SUMMARY AND RECOMMENDATIONS		i
SECTION I	NATURE OF PROJECT	1
	A. Project Description	1
	B. Relationship of Project to Sector Strategy	32
	C. Project Background	39
SECTION II	PROJECT ANALYSIS	54
	A. Executing Agency and Other Participating Entities	54
	B. Engineering Analysis	76
	C. Economic Analysis	84
	D. Financial Soundness	89
SECTION III	LOAN ADMINISTRATION	93
	A. Target Dates	93
	B. Disbursement Procedures	98
	C. Procurement Procedures	98
	D. USAID Monitoring Responsibilities	99
	E. Reports	100
	F. Conditions	100
SECTION IV	ENVIRONMENTAL ASPECTS	103
	A. Summary	103
	B. Environmental Analysis	104

ANNEX I	LEGAL EXHIBITS
ANNEX II	ORGANIZATIONAL EXHIBITS
ANNEX III	ENGINEERING EXHIBITS
ANNEX IV	ECONOMIC EXHIBITS
ANNEX V	FINANCIAL EXHIBITS
ANNEX VI	MAPS

BOLIVIA - SUB-TROPICAL LANDS DEVELOPMENT LOAN

SUMMARY AND RECOMMENDATIONS

1. BORROWER: The Government of Bolivia (GOB) will be the Borrower. The executing agency will be the Instituto Nacional de Colonización (INC), a semi-autonomous public organization within the Ministry of Campesino Affairs, Agriculture and Livestock (MACAG) charged with the investigation, planning, execution and evaluation of colonization.

   Nine other public and private organizations will participate in the loan project. Four of the principal participating, public agencies are within the (MACAG): the Agricultural Extension Service (AgEx), the Agricultural Reserach Service (AgRe); the Servicio Nacional de Desarrollo de la Comunidad (SNDC), and the Servicio Nacional de Reforma Agraria (SNRA). The five remaining participating entities include the Servicio Nacional de Caminos (SNC) under the Ministry of Transportation and Communication; the Servicio Geológico de Bolivia (GEOBOL) under the Ministry of Mining amd Metallurgy; the Banco Agrícola de Bolivia (BAB); the United Churches Group (UCG); and Desarrollo Social y Económico (DESEC).

2. AMOUNT AND TERMS OF THE LOAN: An amount not to exceed $9.7 million, repayable over 40 years including a grace period of 10 years on principal and with interest at 2% per annum during the grace period and 3% per annum thereafter, is proposed. An estimated 48% of the A.I.D. loan will be converted to Bolivian pesos to meet projected local currency requirements.

3. PURPOSE: The goal of the GOB and the USAID/B Mission in the agricultural sector is to promote increased food production in Bolivia and, at the same time, to improve the standard of living of rural small farmers.

   The purpose of the loan is three fold: (1) to increase the productivity and incomes of approximately 11,000 migrant campesino families who will eventually be living in the project area; (2) to expand the production of food crops; and (3) to implement and institutionalize a process which can be replicated by the GOB for developing potentially productive, but underutilized lands in the Bolivian Oriente.

4. PROJECT DESCRIPTION: The project proposed for A.I.D. loan financing consists of several, interrelated activities all of which support the settlement of subtropical lands in the area north of the city of Santa Cruz. Besides enhancing the capabilities of INC for carrying out settlement plans, this project will (1) channel the present migration of campesinos into the San Julian sub-area in the northern department of Santa Cruz by opening up a fertile agricultural area, constructing an all-weather road and access trails in the area and providing production and social services to the settlers, and (2) consolidate the existing settlement in the Chane-Piray sub-area by providing an all weather road and production services.

a. In the Chane-Piray sub-area, where approximately 6,000 small farm families already reside, a limited number of inputs will be provided to "consolidate" the settlment there. These inputs will include:

1) The construction of a 80 km all weather-road extending from Chane-Independencia at the southern extreme of the sub-area to San Juan in its northern reaches. This road construction will be contracted to a private construction firm under the supervision of SNC who will also maintain the road once it is constructed. The road itself will consist of an 8 meter roadbed with approximately 4 meters of crushed rock, all-weather surfacing. The surface of the road will average 90 cm. above the natural terrane and include side ditches and culverts. No bridges or major drainage structures are anticipated at this time. Thus, the road will provide all-year access to the markets of Montero and Santa Cruz as well as those of the principal population centers including La Paz and Cochabamba.

2) The construction of an agricultural service center (ASC) in the vicinity of San Pedro which is located approximately midway in the sub-area. The ASC, which will be built under contract, will be constructed from local materials, i.e., brick, blocks and lumber, and will provide space for a full time staff of 15 people requiring 90 sq. mts of floor space. The ASC will provide the headquarters in the zone for the administration of the various activities associated with the project including the agricultural extension and research activities of the MACAG, the cooperative development program of SNDC, the titling activities of SNRA, and the credit program of the MACAG/BAB.

b. The San Julian sub-area which is in a pioneer stage of settlement, with only approximately 200 settler families living in the area at present, presents a different set of circumstances and therefore requires a different mix of project inputs in order to successfully populate the zone. These inputs will include:

1.) The promotion of settlement in the area among communities and homogeneous groups from the Altiplano and valleys. This activity will be coordinated by INC and carried out by SNDC, and DESEC. Promotion will essentially be an educational program whereby these agencies will realistically explain to various groups the opportunities offered by moving into the area. Those groups interested in resettlement would then contact INC for a reservation of land which would then be allocated to the interested groups. The promotion program should help to direct the migration which is now taking place but, more importantly, will provide a means for transferring socio-cultural institutions along with groups of campesinos. The absence of these institutions in other settlement projects has been isolated as a primary cause of high abandonment rates and thus project failure.

2) The construction of a 100 km, all-weather penetration road extending northward from a point on the German/GOB road west of the Rio San Pablo. The road will be constructed by a private construction firm under the supervision of SNC and will utilize similar specifications as those used for the construction of the road in the Chane-Piray sub-area. Likewise this road will be maintained by SNC and will provide all-year access to the markets of Montero, Santa Cruz and several other population centers in Bolivia. In addition, approximately 800 kms of dry-weather-access-trails will be constructed by INC with equipment to be procured from loan funds. These "trails" will provide access to the all-weather road for those settlers who do not have frontage on it.

3) An agricultural service center (ASC) which will also be constructed under contract near the all-weather road, some 10-20 kms north of the junction of the German/GOB and proposed road. It will be constructed with similar specifications as those employed to construct the ASC in the Chane-Piray sub-area and, likewise will provide the same basic services as that facility.

4) The construction of potable water facilities in each community center (núcleo) and the provision of basic health facilieis in the area. INC will drill approximately two hundred 8" diameter wells to a depth ranging between 50-75 meters in the area using a new rig and materials to be purchased from loan funds. In

addition, one sanitary post will be constructed which will utilize local materials including brick, blocks and lumber. Furthermore, a mobile health unit will be purchased to provide flexibility in the delivery of health services. The services offered by these facilities will provide (a) the principal source of potable water for the people of the sub area, thereby providing for consumption needs and minimizing water born health problems, and (b) basic health care to the campesinos settling in the area. Thus, two important causes of high abandonment rates in previous Bolivian settlement projects will have been addressed: lack of potable water and sickness.

5) An orientation program for groups of campesinos coming from the Altiplano and valleys and settling in the area. Orientation will be administered by the United Church Group (UCG) with the assistance of SNDC and will include instruction in nutrition, sanitation, building construction, basic agricultural practices and small farmer organization and help to develop community solidarity, group decision making processes and foundations of community government. This program, then, is intended to minimize the shock associated with a move into a significantly different environment and to enhance self-reliance among settler groups.

6) The survey and land preparation for settlement of the area. INC will carry out this activity through which it will define the boundaries of the project, specify individual plots and community blocks and determine the path of the dry-weather-access-trails. Utilizing this settlement scheme, INC will administer the settlement of the blocks, seeing to it that communities which have been allocated blocks as a result of the promotion program are properly settled, and that other groups without previous claims are located on appropriate blocks. In addition, INC will administer the sale of project lands to professional and commercial farmers located on the outskirts of the area. Provisional titles will be granted by INC. Once the settler has "proven-up" on his holding and paid the land fee, SNRA will provide clear title. This activity will provide a framework for rationally settling and giving title to the population moving into the area.

The settlement model implemented through the loan project has several innovative aspects as compared to past colonization projects in Latin America and those carried out in earlier GOB settlement efforts. These aspects have been incorporated into the model so as to increase the probability of success of the

settlement process and include: (1) support to areas of advanced spontaneous colonization with demonstrated economic viability and the incorporation of peripheral lands; (2) a method for transferring and maintaining traditional socio-cultural institutions which promote cooperation and stability; and (3) a low cost and cost effective method for carrying out settlement projects thereby enhancing the possibility for replication by the INC.

c. In order to enhance the capability of INC for executing settlement projects in the oriente of Bolivia, technical assistance, administrative support and a land resource study will be financed. Technical assistance will be utilized to improve the INC in the areas of managment, project evaluation and personnel training while equipment and supplies will be provided to that organization to support the loan project. A land resource study using ERTs materials and land survey teams will be financed to provide a basis for the development of a settlement strategy which will be implemented with subsequent settlement projects by the GOB in the oriente. Geobol will carry out the review of ERTS materials while INC with professional assistance will carry out the on-the-ground analysis of potential settlement areas.

5. PROJECT ADMINISTRATION: As is apparent from the Project Description, the loan is a complicated one requring the inputs of eight GOB entities (INC, AgEx, AgRe, BAB, SNDC, SNRA, Geobol, and SNC) and two private organizations (USG and DESEC). The roles of these agencies are:

INC - to assist in the community promotion program, construct "trails" in the San Julian sub-area, parcel and allocate the San Julian area to settlers, provide potable water in the San Julian area, contract or construct a sanitary post in the San Julian area, contract the construction of two agricultural service centers in the project area, administer the provisional titling process in the San Julian area, assist in the execution of the land resource ground survey, and coordinate the loan activities of other participating entities;

AgEx - to provide extension service to the campesinos of the project area;

AgRe - to provide research data for the use of the campesinos of the project area;

BAB - to administer the credit fund to be established for use of the campesinos in the project area;

SNC - to design, contract and supervise road construction as well as maintain the penetration roads once they are built;

SNRA - to administer the final titling phase of the land titling process;

GEOBOL - to carry out basic land resource study of the Bolivian Oriente;

SNDC - to promote settlement among community groups, construct "trails" and other self-help, community development activities in the Chane-Piray area, assist in the settler orientation program in the San Julian area, carry out the cooperative development program, and assist in the credit program;

UCG - to carry out the settler orientation program in the San Julian area and assist in the cooperative development program; and

DESEC - to promote settlement among community groups.

If this multi-faceted project is to be successfully executed, a coordinating mechanism suited to the nature of the project is essential. It is believed that the existing INC Operations Committe, composed of the Director of INC, and representatives from SNDC, SNC, BAB and AgEx among others, could, with modification, serve as that mechanism. Briefly, those modifications include: (1) making the sub-secretary of the MACAG the chairman of that committee; (2) changing the composition of the committee to include mainly the Directors of the entities represented; and (3) creating a GOB Loan Project Coordinator who would be responsible for both project sub-areas, receive and review all project related documentation, provide A.I.D. with an accessible counterpart and serve as the committee chairman's advisor on project matters.

This new coordinating mechanisms would have several advantages over the old systems. First it would create a viable decision maker-the sub-secretary-, who could direct the various participating agency directors to take necessary actions since most of these heads are subordinate to him within the MACAG. Second, the creation of a Loan Project Coordinator would provide for a single

individual with sole responsibility for project activities instead of spreading responsibility among various departments within an institution such as INC.

Thus, with this coordinating mechanism, poor performance by any of the participating agencies at the agricultural service center (ASC) level would be brought to the attention of the Project Coordinator by the ASC Director. The Project Coordinator would then make the necessary adjustments within his power to do so at the ASC. Where higher level decisions are necessary before changes can be made, the Project Coordinator would advise the chairman of the Operations Committee of the nature of the problem and its probable solution. The chairman could then instruct the representative of the relevant agency on the Operations Committee to see to it that the necessary adjustment is made.

6. SUMMARY OF BENEFITS: Economic evaluation of the project indicates a Benefit Cost Ratio approximating 2.4 to 1. As the project reaches maturity it will add six to eight million dollars anually to a total agricultural sector output and produce about fifteen percent of the total agricultural output of the Santa Cruz area.

7. FINANCIAL PLAN: The cost of the Subtropical Lands Development Project is estimated at $15.2 million with a GOB input of $5.1 million, representing 34% of the total cost; an A.I.D. loan of $9.7 million or 63% of the project value, and an A.I.D. grant of $150,000 representing approximately 1% of the total project. Approximately $350,000 or 2% of the total project cost will be provided from community or other donor support.

a. Proposed Use of Loan Funds

It is estimated that 52% of the loan will be used for foreign exchange expenditures for construction materials, equipment and technical assistance. Procurement will be from A.I.D. Geographic Code 941 sources. It is probable that a major portion of all imports financed under the loan will be from U.S. suppliers and that technical assistance will also be from the U. S.

An estimated 48% of loan funds will be spent to finance the local currency costs of the project. That portion of the loan designated for local costs will be disbursed for locally produced construction materials, road design and road construction services, and for the establishment of a revolving credit fund for small farmers in the project area. In addition, some off-the-shelf purchases in accordance with A.I.D. procurement regulations will likely be made.

The GOB's input into the project is primarily in kind in the form of the 200,000 hectares of agricultural land granted and administered by INC for the San Julian settlement project. In addition the GOB is paying for all salary costs of necessary project support personnel as well as for the expenses related to the operation of the heavy equipment purchased for the construction of "trails".

b. Tabular Summary of Financial Plan

The following table shows the project cost breakdown by components, foreign exchange and local costs and sources of financing.

8. BACKGROUND: Although the eastern, subtropical regions of Bolivia hold significant potential for agricultural development and the improvement of the Bolivian campesinos' way of life, a large proportion of Bolivia's rural population, estimated at perhaps 85 percent of the entire rural population, resides on the Altiplano and in the high valleys where population density reaches 400 people per square mile in many areas on very poor soils. While these areas comprise about 34 percent of the nation's total area, much of it is uninhabitable, unhospitable and unproductive due to topographic and climatic characteristics.

Since 1952 the GOB has adopted several new laws and supported numerous projects directed toward more intensive agricultural settlement in the oriente. The projects executed by the GOB varied widely in terms of objectives, location, inputs, characteristics of migrants and organization and met with varying degrees of success. These projects were supported either with external financing from donor agencies including BID and A.I.D. or wholly or in part from GOB resources. The cost per family of three of these projects is as follows:

Project Name	Year Inititated	Cost p/Family 1/
Cotoca	1957	$3,350
Alto Beni I	1961	$2,250
Alto Beni II	1963	$1,605

1/ Applying the same methodology as employed by the IDB and GOB to compute the cost per family (i.e., not including the value of land in the total project cost) indicates a cost for this project of approximately $1,015 per family.

DETAILED FINANCIAL PLAN AND COST ESTIMATE
(US$ 000)

	AID Loan 1/			AID	GOB	Comm. Contr.	Other Donors	Total
	For. Exch.	Local Curr.	Total	Grant	Local Curr.	Local Curr.	Local Curr.	Project
1) Roads	3,915	3,923	7,838		642	150		8,630
2) Production Services	143	847	990		534			1,524
a) Agricultural Service Center	143	347	490		534			
b) Credit		500	500					
3) Social Services	314	13	327		143		200	670
a) Potable water	277		277		48			
b) Health Posts	12	13	25		70		100	
c) Orientation	25		25		25		100	
4) Project Admin	240		240	150	625			1,015
a) Admin Support	40		40		520			
b) Technical Assist.	200		200	150				
c) Titling Admin.					105			
5) Project Location	250		250		3,160			3,410
a) Land					3,000			
b) Land Res. Study	250		250		160			
TOTAL	4,862	4,783	9,645	150	5,104	150	300	15,249

1/ The loan disbursement period is anticipated to be 4 years.

UNCLASSIFIED

Beginning in the mid-1950's approximately 50,000 farm families, representing today about 7% of Bolivia's rural population, have migrated and settled in the subtropical lowlands. It is currently estimated that about 6,000 families per year are leaving the over-populated highlands for the oriente. The GOB recognizes its responsibility to respond to this population movement and remains committed to continuing colonization efforts with special emphasis on developing the oriente with campesino participation. With the increasing rates of spontaneous migration, the emphasis of future assistance must be on channeling migrants to economically productive areas and consolidating production and social services in the areas settled.

9. LOAN IMPLEMENTATION PLAN: Regular A.I.D. loan disbursement and procurement procedures are expected to be followed in the loan project. A detailed description of the implementation plan and PERT Chart are provided in II, A.

10. OTHER SOURCES OF FUNDS: The Export-Import Bank, the World Bank Group (WBG) and the Interamerican Development Bank (IDB) have stated that they are not interested in financing this project. However, the IDB, WBG and other donors have indicated an interest in financing possible future colonization projects in the Bolivian Oriente.

11. STATUTORY CRITERIA: All statutory requirements have been met (see Annex I, Exhibit 3).

12. ISSUES: As indicated by the body of this CAP, the issues raised in the Intensive Review Request and the IRR cable of January 4, 1974 from AID/W have been examined and resolved.

13. RECOMMENDATIONS: On the basis of the conclusions of the Capital Assistance Committee that this project is technically, economically and financially sound, it is recommended that a loan be authorized to the Government of Bolivia in an amount not to exceed $9.7 million, subject to the following terms and conditions:

a. Interest and Terms of Repayment

The 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 not to exceed ten (10) years. Borrower shall pay to A.I.D. in United States dollars on the outstanding 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.

b. Other Terms and Conditions

In addition to the standard conditions and covenants of A.I.D. lending, the Loan Agreement should include the following:

1) Conditions

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

(i) evidence that the lands to be transferred to settlers are subject to no easements or other uses of third parties which might unreasonabley interfere with the settler's use and enjoyment of the lands;

(ii) evidence of adequate staffing in the National Colonization Institute (INC); and

(iii) a plan for the promotion of colonization in the Project area.

b. Prior to any disbursement or issuance of any commitment documents under the loan for any purpose other than to finance consulting engineering, design, or technical assistance services, Borrower will submit to A.I.D., in form and substance satisfactory to A.I.D.:

(i) evidence of the creation of a coordinating mechanism that will include a revised Operations Committee and the appointment of a project coordinator for the INC;

(ii) agreements among those GOB ministries and agencies participating in the execution of the Project, setting forth their roles, responsibilities and contributions to the Project;

(iii) evidence of adequate provision for orientation of new settlers in the Project area;

(iv) a statement of the criteria settlers must meet in order to be eligible to receive title to their lands;

(v) a time phased implementation plan for carrying out and monitoring the project and an evaluation plan for measuring progress toward meeting project goals and assessing the project outputs against planned output targets.

c. Prior to the initiation of any construction activity Borrower shall submit, in form and substance satisfactory to A.I.D., complete plans and specifications for such construction.

2) Covenants

Except as A.I.D. may otherwise agree, the Borrower shall covenant:

(i) to effect necessary staffing changes and additions on a timely basis;

(ii) to review the progress of the Project annually with A.I.D. in accordance with a mutually agreed upon implementation plan;

(iii) to develop and execute a land use policy, within six months of the completion of the land use survey, which, among other things,

(a) acknowledges the firdings of the land use survey,

(b) sets aside lands for future settlement projects, and

(c) outlines a framework for the development of those lands set aside;

(iv) to provide adequate support to the research and extension staff in the project area;

(v) to formalize a small farmer credit mechanism for the project area which involves the Bolivian Agricultural Bank and the Agricultural Extension, Credit and Cooperative Development Agencies; and

(vi) to limit the role of INC in GOB colonization projects to those activities which are generally associated with pioneer colonization, while leaving the longer terms consolidation activities to other governmental agencies, thereby enabling INC to move on to other colonization areas.

14. COMPOSITION OF THE CAPITAL ASSISTANCE COMMITTEE

Larry T. Armstrong	Capital Development Officer, Project Coordinator, USAID/B
R. Jesse Moffett	Chief, Rural Development Div. Project Manager, USAID/B.

Richard D. Dudley	Chief, Engineering and Transportation Div., USAID/B.
David D. Bathrick	Chief, Community Development Div. USAID/B.
Angel M. Diaz	Deputy Program Officer, USAID/B
Douglas M. Jones	Agriculture Economist, USAID/B
William J. Hillier	Financial Analyst, USAID/B
Randolph L. Mye	Economist, USAID/B
Norman Williams	Regional Legal Advisor, USAID/Peru
Michael C. DeMetre	Transportation Economist, AID/W

Drafted by:	Larry T. Armstrong
On:	5/1[illegible] '74
Reviewed by:	Arthur W. Mudge, DD; and Parke D. Massey, AD/CAP
Approved by:	John R. Oleson, Director, USAID/B

SECTION I - NATURE OF PROJECT

A. Project Description

1. Purpose

The specific purposes of the sub-tropical lands development loan project are: (1) to increase the productivity and incomes of approximately 11,000 migrant campesino families who will eventually be living in the project area; (2) to expand the production of food crops; and (3) to implement and institutionalize a process which can be replicated by the GOB for developing potentially productive, but under-utilized lands in the Bolivian Oriente with participating small farmers.

To achieve the purposes of the project, the following items will be financed from loan funds:

1. the improvement of approximately 80 kms of existing road in the Chané/Piray area and the construction of approximately 100 kms of new roads and the development of approximately 800 kms of access trails in the San Julian zone;

2. the construction of one agricultural service center in each of the Chané/Piray and San Julian areas to promote technological change, cooperative development and land titling assistance to the small farmers of these regions;

3. the drilling of sufficient numbers of potable water wells in the project area to provide for the needs of approximately 5,000 small farm families;

4. the construction of a small health post and the purchase of a mobile health unit to provide for the initial needs for health services in the San Julián area;

5. the implementation of an orientation program which will provide the settler entering the San Julian area with information and assistance needed to help him and his family adjust to their new environment;

6. the provision of administrative support and technical assistance to the Instituto Nacional de Colonización; and

7. the execution of a land resource study to determine the suitability of other areas in the Bolivian Oriente for future settlement projects.

This new process for developing and incorporating new areas of the Bolivian low lands into the agricultural economy has been designed to accelerate and maximize the long-run effectiveness of the spontaneous, rural migration already taking place. The activities proposed here are an integral part of the GOB's development strategy growing out of its recent Sector Assessment, (see I,B, 1) and are likewise in accord with USAID's views of sector priorities which were articulated in the Mission's DAP presented to AID/W in November, 1973.

2. Focus of the Project

Historically the greatest share of Bolivian economic activity has centered in the Altiplano and the mineral rich upland valleys of the two great cordilleras which form the Andean chain. Even today a large proportion of Bolivian's rural population - perhaps as much as 85 percent - resides in the Altiplano region and in the highland valleys of the Andean Mt. Range: These areas comprise about 34 percent of the nations's total land area, much of which, due to topographic and climatic characteristics, is uninhabitable, inhospitable and unproductive. The bulk of the rural population here ekes out a marginal living from subsistance agriculture, cultivating potatoes, barley, corn, wheat, quinua, and in selected areas, other cool season vegetables. The typical campesino farmer also tends livestock usually consisting of sheep, llama or alpaca, and often pigs, cattle or poultry. The land ownership pattern, largely as a result of agrarian reform activities dating back to 1953, is predominantly minifundia characterized by many small farms averaging perhaps no more than 2 to 3 cultivable hectares per family. Population growth and inheritance practices continue to result in further subdividing of the relatively small plots. The Altiplano and valley regions are thus becoming more and more overpopulated relative to the capacity of the land resource base.

Furthermore, off-farm employment opportunities in these upland areas are relatively few and the non-farm sector has shown limited capacity to absorb surplus agricultural labor. As a result, many campesinos who remain in the agricultural sector are underemployed in the sense that they contribute little to agricultural production in the region. The marginal productivity of agricultural labor and,

likewise the return to farm labor is low with the result that rural incomes in the uplands are depressed and most campesinos live close to margin of subsistance.

In contrast, the Bolivian Oriente is characterized by large tracts of arable lands with very limited population. A large and modern commercial agricultural sector is developing in the central oriente around the city of Santa Cruz, and now produces about 20% of the national output -- much of it for export. Santa Cruz agriculture typically employes large amounts of capital; is management intensive by Bolivian standards; and demands substantial amounts of seasonal and full-time agricultural labor at comparatively attractive wage rates.

There is also a viable small farm sub-sector which has developed in selected areas of the oriente in the past decade. Per capita production and incomes of small farmers here are significantly higher than in the heavily populated Altiplano and upper valleys, and several studies have been completed which indicate the increases in income that can be realized by migrant families who move from the highlands to the lowlands. Wessel, who studied a sample from eight villages in 1970, estimates that average farm family income increases from $242 to $427. 1/ Graber's study showed that average net family income in the Cuatro Ojitos settlement, which is located on an all-weather road with ready access to the Santa Cruz market area, was $1052 in 1972. 2/ Royden in a 1971 study of the same area estimates average per capita (rather than per family) income at $178 compared with an average income of $44 per rural dweller in the country as a whole. 3/

The fact that productive land in the oriente is abundant and can be brought into production under labor intensive technology represents a singular opportunity for increasing employment and income levels for a large number of campesino farmers from the overpopulated highlands by their participating in the development of hitherto unexploted land which will contribute substantially to regional and national econmic growth.

Thus, development of these underpopulated areas of the Bolivian Oriente has become a major concern of the GOB in recent years. Since

---

1/ Kelso Wessel, The Profitability of Small Farms in Bolivia, Cornell University, mimeograph N° 27, pp. 26.

2/ Kenneth Graber, Agricultural Life in the Colonies, Methodist Church in Bolivia, 1972, pp.75.

3/ Thomas Royden and Boyd Wennergren, "The Impact of Access Roads in Spontaneous Colonization" (Logan, Utah State University, 1973) pp.67-68.

the revolution in 1952 the GOB has adopted numerous policies and undertaken a number of projects directed toward more intensive agricultural settlement in the oriente. Various settlement schemes have been attempted: some with external financing from donor agencies including IDB and AID; others financed wholly or in part from GOB resources. These projects have varied widely in terms of objectives, location, inputs, characteristics of migrants, and organization, and they have met with varying degrees of success.1/ Since the mid-1950's approximately 50,000 farm families, or about 7% of Bolivia's rural population, have migrated and established themselves in the sub-tropical lowlands. Approximately 80 percent of these have migrated spontaneously, and the rate of such migration has increased rapidly in the last five years. It is currently estimated that about 6,000-8,000 families per year leave the overpopulated highlands to seek a better life in the oriente.

The GOB recognizes its responsibility to further promote opportunies and production and remains committed to continuing efforts to develop the oriente with campesino participation. The problem is to find a way to make colonization movements more effective at a low cost which will enable the GOB to accelerate the incorporation of unexploited, potentially productive land. To achieve this end, the project model seeks to combine the positive features of past directed and spontaneous colonization efforts. In addition, the model has incorporated several innovative features which are also aimed at that end and are consistent with the findings and conclusions of an evaluation of the Bolivian experience as outlined in I, C, 2: (1) it focuses on support to areas of advanced spontaneous colonization with demonstrated economic viability and the incorporation of peripheral lands; (2) it facilitates the transfer and maintenance of traditional socio-cultural institutions which promote cooperation and stability; and (3) it provides the GOB with a model or prototype which is low price and utilizes cost effectiveness principles, thereby enhancing the possibility for replication by the National Colonization Institute.

3. Suggested Model for Bolivian New Lands Development2/

a Stages in Settlement Process

Three successive stages in the development of new lands have been identified: pioneer, consolidation, and development. These divisions are somewhat arbitrary in that there is a continuous gradation between stages

1/ For a discussion of principal studies describing Bolivian colonization experience see Part C of this Section.

2/ The generalizations set forth in both parts a. and b. of this section draw heavily upon the related material from Michael Nelson, The development of Tropical Lands: Policy Issues in Latin America. (The John Hopkins Press: Baltimore, 1972).

and, in some development areas, all three stages may be observed simultaneously. Nevertheless for analytical purposes such a classification is useful.

Typically, pioneer zones are characterized by: (1) recent and continuing settlement of lands which are being cleared of natural vegetative cover; (2) poor housing, infrastructure, and access roads; (3) primarily a subsistence economy; (4) unstable settlement and high rates of settler turn-over; (5) no urban development, utilities, or services; (6) lack of a mechanism to establish legal titles; (7) low capitalization in agriculture; (8) little formal settler organization; (9) virtually no internal labor market; and (10) limited settler knowledge of soil capability, climate, crops, or management practices.

Consolidation may follow 5 to 10 years after pioneer settlement. There is a general up-grading in all physical aspects: (1) land tenure and settlement patterns are more stable; (2) settlers have less contact with their original home areas; (3) there is less abandonment of parcels; (4) some consolidation of holding occurs; (5) larger crop areas are achieved; (6) market orientation of production increases; (7) knowledge of agriculture suited to the zone improves along with capacity to effectively use credit; (8) urban centers with commercial and government services develop; (9) higher capitalization in agriculture appears in the form of plantation crops and livestock; (10) a labor market forms; (11) more permanent housing and infrastructure are built; (12) small scale processing of agricultural products and saw milling develops; and (13) colonist organizations or even local government is formed.

The development phase occurs perhaps 5 to 10 years after consolidation and is characterized by: (1) a significant urban center and a major flow of private capital into industrial and commercial activity; (2) well developed local markets for agricultural products in the region provided by the urban population; (3) a firmly established local government with active settler participation; (4) the transfer of many central government services to local entities or private civic organizations; (5) an improved agricultural technology and accelerating demand for credit; and (6) the substitution of capital for labor.

The rapidity with which an area may move from one stage to another depends in part on the socio-political environment in which development occurs, intrinsic economic factors, and the incremental public sector (and sometimes private) resources which may be allocated to the development process.

b. Types of Settlement Models

With regard to participation of government in a settlement project, two types of models may be described: directed and spontaneous. There are, of course, various gradations also found between these two models. The directed model implies a substantial input of public resources and generally a high level of direct subsidies to individual settlers. Under the spontaneous model, little public support is provided either to the individual or to settlers in groups. Migration generally occurs in response to economic pressures and incentives and only after initial settlement has occurred and the development area moves into the consolidation stage does government normally take an active role. Directed colonies have had, for numerous reasons, a high incidence of failure by most standards of evaluation. 1/ Moreover they have exhibited high levels of per settler expenditure not only of financial inputs but also of administrative time thus placing a severe drain on the public treasury and on generally scarce government management talent.

c. The Conceptual Model for Bolivia 2/

The model proposed hereunder accepts as a general goal the GOB's desire to absorb in the oriente the net increase in rural population in the highlands. It also presupposes the need to direct migration into areas of high agricultural productivity with the capacity to produce a crop production mix favoring Bolivia's principal commodity needs (i.e., mainly food crops in short supply domestically which will reduce import requirements or crops having high foreign exchange generating capacity). To support the development effort in these areas and to achieve stable settlement and agricultural growth requires additional infrastructure, social services and technical agricultural support for new communities of settlers.

While such infrastructure and services are important, it is necessary to recognize the trade-off between level of services and cost. Thus the concept of project economy is especially important if there is to be any realistic possibility for extending the proposed

---

1/See Section I, C for details on the evaluation of both directed and spontaneous colonization in Bolivia. It should also be borne in mind that equally high incidences of failure may also occur in spontaneous colonization, that few records or data exist for the spontaneous efforts which fail in the pioneer stage.

2/This section also draws heavily upon the policy implications and project design recommendations of Nelson, op. cit.

process for new lands development into other areas and if this development process is to be institutionalized. It is quite evident that the costs of previous GOB colonization efforts exceeds that which would be manageable within GOB budgetary constraints if a significant resettlement process (in terms of magnitude and efficiency) is to be achieved and sustained. A low cost process therefore must be sought which also, on the basis of prior experiences, provides the minimum necessary conditions to insure the most effective utilization of government inputs as well as the settlers own resources. This process must also recognize weaknesses in the institutional structure and limitations on technical and management expertise currently characterizing GOB agencies which will be required to implement and support these development efforts.

A model for Bolivia must also seek to avoid problems encountered in prior projects and build on the insights which have been gained in previous attempts at new lands development. An evaluation of previous colonization projects and settlement efforts in Bolivia and other parts of Latin America is presented in Section I,C.

Findings of those analyses indicate that six factors are of critical importance to the success and stability of new lands settlement programs. These factors include:

1. The presence of an all-weather access road.
2. The location of production in response to market forces.
3. The presence of social-cultural institutions which reduce the risk associated with migration.
4. The economic viability of production.
5. The development of cooperative action.
6. The presence of a potable water supply.

In addition to these factors which are necessary minimum conditions to support successful new lands development, experience and analysis of the general Bolivian situation suggest that provision of certain additional government services will yield high rates of return on the social investment and accelerate development in the area. These services include basic health care services and adult education.

d. Configuration of the model

The suggested model for this project may be described as "semi-spontaneous" since it seeks to overcome the disadvantages of both directed and spontaneous settlement and permits implementation

at minimum cost. Consistent with the findings and recommendations of the IDB 1/ and Nelson 2/ studies, the loan project focuses on support to areas of advanced spontaneous colonization with demonstrated production viability (the consolidation stage) and the incorporation of peripheral lands (the pioneer stage). In the settlement of the latter, the project is sensitive to the need to transfer and maintain social-cultural institutions to reduce the risks associated with migration as recommended by Keller and Aitken 3/ and to assist in the development of groups for cooperative action. This will be facilitated through the settlement of groups, homogeneous by origin or background.

The general approach to new lands development pursued in the loan project model involves the successive integration of peripheral lands into already developed agricultural regions, e.g., the project area would be absorbed into the Sánta Cruz pole of development and gradually absorbed into the agricultural sector as a whole. Such an approach makes maximum use of infrastructure and social capital already in place, relies in large part on established market demand and services in nearby population centers, and thus captures external economies for development occurring within the project area itself. Likewise, the growth of the already developed area is reinforced as additional services required to support the sub-tropical lands development project area provide increased employment and income opportunities. Thus the growth pole and its hinterland are mutually supportive, although clearly in different stages of development.

Also to the extent that extreme variations in the agroclimatic environment are absent, the production capability of the project area can be inferred to be somewhat similar to that of already developed farm lands adjacent to the project area. This provides some assurance of the longer run production viability for the new lands assuming that comparable levels of technology can be utilized by settlers in the newly developing areas and minimizes the research and extension tasks to be addressed by the agricultural development institutions. To maintain

---

1/ Interamerican Development Bank, Evaluation of Tropical Colonization Projects, Latin American Papers on Agricultural Development, N° 7 Washington, June 1970'

2/ Nelson, op. cit.

3/ Gordon N. Keller and Percy Aitken, "Socio Cultural Factors in Colonization in Bolivia, Utah State University Series, La Paz, 14/74.

and expand the viability of production, however, a range of support services to agriculture is to be provided including research, extension, credit, improved marketing information, etc. Such services tend to increase the productivity and well-being of the small farmer thus increasing real income even further and providing greater incentives to others to migrate.

To support the integration of the project area with already developed areas will necessitate the extension of the transportation system into the new lands area. A well-developed penetration road designed to support all-weather traffic is a basic requirement. In this project two such roads will be provided. A network of feeder routes to provide access to lands not fronting on the penetration road is likewise necessary and will increase the density of settlement and intensity of use of the trunk route. Along with access trails, which through community initiative and self help measures can be later developed into higher grade roads as development dictate, a reliable supply of potable water must also be provided as elements of basic infrastructure to support stable settlement in newly developing areas. Both will be provided in this project and an emphasis placed on self-help group action to address their maintenance and further development. Where potable water does not exist or is not readily accessible through development of shallow wells (within the capability of individual settler) then public support for investment in community water systems is required.

Past new lands development efforts in Bolivia have attempted to provide many of the above services as part of specific development projects. The agricultural support services as well as those for education and health have often been administratively and financially a project-confined responsibility of the agency sponsoring resettlement To a significant degree this broad function is still shouldered by the INC. In this project, as in the suggested model, government services, which are normally provided in other areas, will be expanded into the project area and provided as a part of the regular programs of the various participating agencies and ministries.

4. <u>Project Locale Characteristics</u>

a. Criteria for Selection of the Project Area

Drawing upon the policy and project design recommendations of the Nelson study, prior INC site studies and evaluations and the

preliminary findings of the sector assessment, the following criterion were developed to select the project area from a number of possible sites in the oriente where the GOB has plans for sub-tropical lands development:

- an area of advanced spontaneous colonization with demonstrated economic production viability, i.e., at the consolidation stage along with contiguous undeveloped areas of highly similar agro-climatic characteristics;

- the capacity of the area to produce crops and livestock products in short domestic supply, crops and livestock that can be exported, and crops for subsistence purposes until the farms become fully commercialized,

- the proximity to or existence of social and productive infrastructure already in place;

- the proximity to proposed regional agricultural development service centers for the central oriente referred to in DAP, i.e., the Saavedra Station (a part of the focus of this proposed center is a strong supportive role to the GOB's sub-tropical land development effort);

- the lack of other similar external donor activity in the area.

b. Project Location

The selected project area lies in Santiesteban and Nuflo de Chavez provinces of Santa Cruz Department located approximately 75 miles north of the city of Santa Cruz (see Annex VI , Exhibit 1). The area of advanced spontaneous colonization with proven production viability is known as the Chane-Piray. It is roughly triangular in shape, bounded by the Rio Chané on the south, the Rio Piray to the west, and the Rio Grande to the east. About 200,000 hectares are included in this sub-area. Access from Santa Cruz is via the all-weather road which runs north about 25 miles to Montero and onward to the fordable crossing of the Chané River at Chané-Independencia. The Chané-Piray is currently occupied by about 6,000 small farm families who have spontaneously taken up some 125,000 hectares in the area over the past several years concentrated along the belt of land made accessible by a Gulf Oil exploration road. Virtually none of their claims have yet advance to the titling stage although some of the occupants have been in possession of land since the early 1960's. This area is expected, with improved access, to absorb up to 1,000 additional families working an additional 35,000 hectares.

A contignous undeveloped area with similar agro-climatic characteristis to the east of Chane-Piray and is known as the San Julian area.

It is reached via the road from Montero eastward to Puerto Banegas on the Rio Grande and from there along the route of the all-weather road to San Julian now under construction with assistance from the Federal Republic of Germany. Extending some 90 to 120 miles nortwesterly from this road between the Rio Grande and the San Julian rivers lies a large tract of potentially cultivable land. Because of limited access to this area, few attempts at settlment have been made to date. At present, there are approximately 200 families now settled in this area. However, based on the high potential of the area as revealed from prior INC studies of a series of potential colonization areas, the San Julian area now represents the GOB's priority area for new lands settlment and development. About 200,000 hectares of this area will be included in the current project, enough to adequately absorb 4,000 to 5,000 campesino families. An area of equal size and apparent potential lies to the immediate northwest and undoubtedly will become a focus of future development activities.

c. Soils, Vegetation and Climate

Except for the fact that settlement is well advanced in the Chané-Piray, both areas are ecologically similar. Both areas contain a high proportion (approximately 60% - 70%) of Class I and II soils -- mostly alluvially formed, medium-textured loams -- which with proper management practices and crop rotation are suitable for permanent cropping systems. The bulk of the remaining lands, while of the same apparent material, are subject to occasional flooding and internal drainage problems. Until major improvement works are undertaken to correct those problems, these lands are better suited to permanent pasture or timber production. Only a small proportion (2% - 3%) is classified as waste land.

Native vegetative cover consists mainly of a heavy growth of low subtropical scrub brush lightly interspersed with a wide variety of mixed broadleaves timber species generally not exceeding 10-12 meters in height and 15 to 18" in diameter. The scrub brush is heavily overlain with a tangle of fast growing vines and trailers which restricts travel in the area to existing roads and primitive trails.

Rainfall and temperature patterns are also similar, with within area variations exceeding mean variations between the two locations. Mean precipitation ranges from 35 to 45 inches annually with heaviest rainfall occurring in January and February. In general this is adequate for a broad range of annual crop enterprises without any need of supplemental irrigation.

d. Cropping Patterns in Project Area

Based on current farming experience in the Chané-Piray and adjacent areas, the major crops to which the area is suited are cereal grains: mainly corn and dryland rice. Other grains such as wheat and sorghum also appear to be adapted to the area although there is insufficient experience with these crops to date to draw definite conclusions. The area is also ecologically favorable for cultivation of oilseeds crops such as soybeans and peanuts. Cotton is being grown successfully a few miles to the south. Sugar cane likewise is well adapted to the area although given the present location of processing facilities high transportation costs limit the areas where cane can be grown and marketed profitably. Fruits and vegetable crops are also being grown with success in the project area, but because of the perishable nature of these products and the distance to markets, production of these crops must be geared, initially at least, to local consumption.

Small livestock enterprises are also important aspects of the development which has occurred in the small farm sector in the Chané/Piray and other adjacent colonization areas. Major activities involve poultry, pigs, and dairy cattle production, mainly with a view toward family subsistance and local consumption. A few sheep, goats and beef cattle have also been observed on farms in the area.

While the above indicates that a large variety of farm enterprises are technologically well suited to the area, economic factors -- prices, production constraints, and marketing practices -- have resulted in rice and corn being the major commercial crops currently being marketed by the small farm sector in this region; and it is likely that these crops will continue to be the mainstays of production in the project area. Other crops however are being produced by the small farm sector mainly for domestic consumption and nearby local markets, and most farms have at least one livestock activity. Such a diversification of farming enterprises appears to be a rational management strategy for small farmers in that it spreads the risk of crop failure (or low yield) over several enterprises; provides a more stable time-balanced demand for limited farming resources -- mainly family labor; and gives the farmer a familiarity with a range of production alternatives among which to choose to maximize farm income.

5. Project Components

Specific components of the project for which AID loan, GOB and other financing is being provided are illustrated in Table 1.

TABLE 1

COST BREAKDOWN OF PROJECT COMPONENTS

(US$ 000)

	AID Loan 1/	AID Grant	GOB Contrib.	Comm'ty Contrib.	Other Donors	TOTAL
1. Roads & Trails	7,838		642	150		8,630
2. Production Services	990		534			1,524
a) Agr.Ser.Centers	490		354			
b) Credit	500		180			
3. Social Services	327		143		200	670
a) Potable Water	277		48			
b) Health Posts	25		70		100	
c) Orientation	25		25		100	
4. Project Admin.	240	150	625			1,015
a) Admin Support	40		625			
b) Tech.Assist.	200	150				
5. Project Location	250		3,160			3,410
a) Land			3,000			
b) Land Res Study	250		160			
TOTAL	9,645	150	5,104	150	200	15,249

1/ The loan disbursement period is anticipated to be 4 years.

a. Penetration Roads

Funds are being provided to finance the construction of

two all-weather roads to provide basic access into the project area. Additionally a network of dry weather access trails will be constructed to connect with the main trunk routes and provide access to the farm areas not fronting directly on the all-weather roads.

One of these main roads will involve the improvement of the existing penetration road which connects Chané-Independencia with Piray, some 80 Kms. to the northwest. The improvement of this road is expected to immediately benefit the estimated 6,000 families who have already settlerd in the area. Further, it will provide increased incentives for more intensive settlement of the northern reaches of this sub-area where an estimated 1,000 additional small farm units could be developed.

The other all-weather road, which will be constructed into the San Julian sub-area will connect with the German-GOB road about 20 Km. from the San Julian river and extend northwesterly paralleling the river for about 100 Km. This route will provide access to approximately 200-250,000 hectares of undeveloped agricultural land and create settlement opportunities for approximately 4,000 small farm families. This access road may be regarded as the first phase of development of the San Julian sub-area since extension of this artery and construction of additional dry weather access trails beyond the project area would make accessible an additional 180-200,000 hectares for development of some 4,000 additional farm units.

Construction of the two all-weather roads will be contracted to a private construction firm. The National Road Service (SNC) will supervise the design and construction and will be responsible for maintenance when completed and integrated into the national road network. The cost attributed to the AID loan for the construction of these roads is expected to be $6,732,000 while SNC's supervision and operational support is estimated at $174,000.

Dry weather access trails will be developed to provide settlers located away from the all-weather road with rudimentary access to that facility. These "trails" will generally not exceed 8 or 10 kilometers in length and will be of such minimum specifications as to be suitable for one-way traffic in a high clearance vehicle.

The National Community Development Service will take the lead in improving existing "trails" in the Chané-Piray area, relying on self-help and community cooperation efforts to complete the work.

Therefore, there will be no charge to the AID loan for these activities. In the San Julian area, the INC will construct the necessary "trails" which will inter-link the various community settlement nucleos (see II,A,6) with the main all weather road. Loan funds in the amount of $1,106,000 will be utilized for the purchase of heavy equipment, spare parts and special lubricants which will be used by INC to develop these access trails in San Julian. Costs to INC, including operation and maintenance of equipment, are estimated at $468,000 over the life of the project. Community contribution to the maintenance is expected at $150,000 over a four year period.

b. Production Support Service

1) Agricultural Service Centers

It is planned to establish two agricultural service centers one in each of the project sub-areas -- to provide technical support for settlers in the area and to serve as a focal point for regional agricultural development activities. A major function of these service centers will be to provide facilities through which agricultural extension services can be provided and to develop effective linkages between farmers and the existing agricultural research facilities at Saavedra. A branch research sub-station will be established as part of the service centers, the purpose of which will be to discover the best-adapted agricultural technologies for the agroclimatic environments which exist locally. Special emphasis will be on adaptive types of research activities such as variety testing, planting dates, seeding rates, etc., for the major crops, and other cultural practices and cropping systems aimed at improving the efficiency of agricultural production consistent with the available resources of small farmers in the area.

The resident research staff from the Saavedra Ag Experiment Station will be relied on to design research experiments and give necessary supervision to their execution. However, additional support personnel will be required to assist at each sub-station.

Staff of the agricultural extension service which will be assigned to each service center will coordinate closely with research workers to insure that the relevant research results are transmitted to farmers in the area. They will also undertake the more traditional functions such as working with cooperating farmers to develop farm management plans, promoting seed reproduction and distribution, providing assistance for insect and disease control, assisting in the formation of cooperatives and other farmer organizations, etc., and as

noted below, will provide advisory services to the Agricultural Bank of Bolivia in the area of production credit. As the respective areas develop and as the need for additional agricultural support functions grows the service centers can be used for other functions such as distributing agricultural inputs, serving as a hiring hall for seasonal labor, or providing specialized marketing services for farmers.

The service center will also serve as a headquarters for public agencies including the INC, SNDC, etc., and shall include facilities for the Agricultural Bank through which credit programs will be provided (see following subsection). However, primary responsibility for the administrative operation of the service centers will rest with the Agricultural Extension Service.

It should be noted that this concept of agricultural service centers, as a method of upgrading the agricultural technology base of the small farm sector, has been endorsed in the recommendations of the Ministry of Agriculture completed sector assessment and constitutes a major element of their proposed program strategy (see I B, 1).

The major inputs to be provided under this loan in support of the Agricultural Service Centers will be for construction of physical facilities to house and office the service center staff and related operatives, vehicles to provide adequate mobility to give the staff reliable access to the respective sub-regions, and certain operational expenses and other equipment. The estimated cost of these items is $490,000. GOB inputs will be mainly in the form of staff salaries and operational expenses expected to cost $354,000 over the life of the project.

2) Agricultural Credit

It is anticipated, initially at least, that the major agricultural credit requirements in the San Julian area will be for short term loans for production inputs. Such loans would probably not have a maturity greater than four to six months and would be used for the purchase of seed, perhaps some agricultural chemicals for pest control, and especially for the labor cost of rice and corn harvesting. Gregg has estimated that in the San Julian area a typical campesino farmer's production credit needs would average about $200 per year over the first several years. 1/ Given a phased influx of

1/ Russel B. Gregg "Agricultural Credit for Sub-Tropical Colonization Project - an Intensive Review Paper" unpublished paper USAID, March 19, 1974 Page 5, Table 1.

settlers over a 3-4 year period production credit requirements for the San Julian area are estimated at about $200,000 annually over the initial years of the project.

As settlers become more firmly established some increased credit will be required for the purchase of livestock -- mainly dairy cows and pigs. Such loans would require a longer maturity of perhaps 12 to 36 months. Later on there may be further need for intermediate term loans for draught animals and some intermediate technology level machinery. However, as settlers become better established in the community, the range of credit alternatives open to them also expands.

In the Chané-Piray area both short term production credit and intemediate term loans as described above are already needed. While a more complete analysis of farm production systems in the Chané-Piray might provide a more accurate estimate of total credit needs, Gregg's estimate of about $350 per settler in the Chané-Piray is a reasonable rule of thumb of the annual credit requirements in this area. 1/ Given that some settlers obtain loans through other informal or organized credit sources; that others are rationed internally out of the market for loan funds, and that slack demand period for short term loans would create temporary liquidity surpluses, only 15 percent of the estimated credit requirements for the Chané-Piray area will be provided under this loan. An initial input of about $300,000 is required for this area, bringing the total agricultural credit requirement for the project to $500,000. The agricultural bank (BAB) and MACAG's contribution to this program in salaries and operating expenses is estimated at $180,000.

c. Social Services

1) Potable Water

In order to insure that potable water is available to new settlers in the project area, rudimentary community water systems will be developed at several selected locations. Since adequate potable water has already been developed to support the existing settlement in the Chané-Piray area the major effort will be in drilling new wells in the San Julian area.

1/ Gregg, op. cit. p. 6, Table 2.

Experience to date suggests it will be necessary to drill 8" wells to a depth of 50 to 70 meters to obtain adequate water to meet requirements of the proposed communities. Responsibility for siting and drilling these wells will rest with INC and will be carried out by personnel of that agency. A minimum of one well per group of 40 families will be required, and in more central locations with heavier population concentrations additional wells will be needed.

Funds provided under this loan will be used to purchase drilling equipment, well casing, pipe, hand pumps, filter material, etc., to develop an estimated 200 wells in the San Julian area. The cost to loan funds for this activity is estimated at $277,000 while the INC contribution in salaries and operation expenses is estimated at $48,000.

2) Health Facilities

Funds are provided under the loan for the provision of a minimum level of public health services in the San Julian area. A sanitary post will be constructed and a Mobile Health Unit will be provided to give public health personnel maximum flexibility in the project area. Total cost to the loan for these facilities is expected to be $25,000, while the GOB input for salaries and operational support is expected to be $70,000 over the life of the loan. In addition other donors will contribute an estimated $100,000 for the maintenance, management, and supply of existing health facilities in the Chané-Piray subarea.

Once established the sanitary post facility will be staffed and integrated into the national health system administered by the Ministry of Health as part of that agencies' on-going program. The mobile health unit will be retained by INC and used in future settlement programs.

3) Orientation Program

A short term orientation program will be provided to groups of new settlers in the San Julian area. This program will be directed by the United Church Group (UCG) in accord with agreements already formalized between representatives of that agency and the INC. Some assistance will also be provided through the SNDC in the area of cooperative and pre-cooperative development.

The orientation program will give attention to group decision making processes and focus on problems and techniques to improve nutrition, crop husbandry, health care, community cooperative organization, building construction, land clearing, animal husbandry, and other programs designed to give settlers confidence in adjusting to their new environment and to increase their capacity to deal with the physical and ecological problems of the lowlands. The main target of this orientation program will be those homogeneous groups of migrants which have joined together and settled in community groups.

Major funding for this program will be derived from contributions arranged for by the UCG. However, a small amount of the loan or approximately $25,000 will be used by the INC to purchase vehicles and equipment which will be assigned to UCG to support the orientation activities which will be carried out at various núcleo sites. The GOB will provide approximately $25,000 to support the salary costs of UCG "orientadores" while other donors will provide approximately an additional $100,000 in UCG support for orientation.

d. Project Administration

Loan funds will also be provided to support project administration and to assist the INC in developing and formalizing a long run strategy which institutionalizes the new lands development process.

1) Administrative Support to INC will require purchase of office and communication equipment and vehicles required for management and coordination in the project area. Approximately $40,000 of loan funds will be used for this purpose while the GOB will provide approximately $625,000 for salaries and operational expenses at the Central Montero and San Julian INC offices.

2) Technical Assistance in the form of consultant services to the INC to further develop and strengthen its capabilities in the are of project management, evaluation, and personnel training will be required. Three man years of such services are planned totaling approximately $200,000 of loan funds. In addition, grant AID funds of $150,000 will be used to provide for the contracting of a project supervisor.

e. A Land Resource Study

A Land Resource Study will also be financed from loan funds. Initially this will involve a survey of the lowland areas of eastern Bolivia using satellite mapping and analytical techniques

developed by the Earth Resources Technology Satellite (ERTS) Program in order to identify those areas with characteristics suitable for intensive agricultural settlement. $250,000 of loan funds will be used to finance this study, while the GOB will provide approximately $160,000 for salaries and support cost and the execution of a "ground truth survey".

Those areas having been determined by the ERTS Program to be potentially suitable for development will then be subjected to more intensive ground investigation by teams of soil and plant scientists, engineers, economists, etc., to determine in greater detail the character of land resources and other agroclimatic features. The results of these studies will become the basis for a comprehensive plan for future development and will be of importance in establishing priority orderings not only for the INC but for other Bolivian Government agencies as well.

The first phase of this study will be conducted under the general direction of GEOBOL whose previous experience with land evaluation techniques is unique in Bolivia. Loan funds will provide the basic ERTS imagery, technical assistance in agricultural land evaluation and selected items of equipment to improve the detail of the analysis required for the first phase of the study. The second phase will be a GOB effort financed from their own budgetary resources.

6. Selected Operating Criteria and Other Factors Related to Project Design

a. Land Allocation Criteria

The planned land allocation pattern for unsettled areas of the project proposes a dual system to accommodate both large and small farms and provides a mechanism for group settlement of small farmers aimed at developing homogeneous communities of people with common ethnic background or geographical origin.

1) Group Settlement

This feature is specifically designed to facilitate the transfer and maintenance of the various social and cultural institutions which are important to the campesino family in the highlands and which strengthen community solidarity and individual security in the new environment. This form of settlement will provide security for migrants since neighbors and friends can move together, thus carrying with them their social-cultural institutions that minimize risk associated with migration.

The compadrazgo, aini and minka are important features of the campesino'slife which tie individuals together under reciprocal obligations to exchange labor, lend goods or money, or otherwise assist in time of need. Similarly community fairs, fiestas and labor tax obligations serve to bind people from adjoining communities with each other thus providing a broader social and cultural life and providing a basis for intercommunity cooperation. The presence of these institutions in the newly settled areas will reduce the risks associated with individual migration and will contribute to greater community stability in the long run. Moreover the group settlement concept is conducive to greater cooperative action and community self-help programs inasmuch as settlers will live in close proximity to each other and have greater opportunities for social interchange.

The basic idea is to allocate land so that people from an area or community in the highlands are settled on neighboring parcels in the project area. In order to achieve effective group settlement, land will be provided to establish small village communities (núcleos) adjacent to or in the center of a series of parcels. Such a village settlement pattern permits a more efficient utilization of social overhead capital, i.e., water points, roads, trails, schools, promotes greater cooperation, leads to earlier functional specialization and development of markets for services and in general contributes significantly toward greater social cohesion.

Experience to date in two or three pilot areas in the existing San Julian area where the group settlement idea has been tried, suggests that 40 settlers per núcleo is large enough to make efficient use of infrastructure and to generate a spirit and attitude of cooperation which achieves benefits for the group as a whole. This number is not so large however, as to present management problems or give rise to serious factional problems which tend to arise from polarized nodes of leadership in larger groups. Because settlement is already well advanced in the Chané-Piray area, this concept of providing for the relocation of homogeneous community groups will be primarily applicable to the San Julian area.

Inasmuch as the basic conditions influencing the spontaneous movement of people from the highland areas to the oriente already exist, no major effort to recruit or select either individuals or groups of settlers for the San Julian area is contemplated. However, some promotional activities directed toward communities in the upper

valleys and the Altiplano will be carried out. SNDC and DESEC will have primary responsibility for this promotional effort which will consist largely of an information program outlining ways in which communities or homogeneous groups of individuals may acquire tenure rights to land in the project area. INC proposes to work through SNDC and DESEC which have on-going programs in the highland areas to encourage migrants with a common origin to settle in groups in such a way that the important socio-cultural institutions will be transferred from their original home to the new settlement and thus ease their social and economic transition into the new environment.

2) Farm Size

Farm size for campesino farmers will be limited to between 30 and 40 hectares and are expected to average about 33 hectares. This size of parcel can be farmed economically under a continuous cropping system relying mainly on family labor, mechanized tillage methods utilizing either tractor or animal power, and associated modern biochemical technology. While it no doubt will be several years before adequate technological development and capital formation occurs to permit modern mechanized production methods to be utilized extensively in the project area, between 30 and 40 hectares will provide adequate land to insure settlement stability under the more traditional slash and burn cultural practice which will prevail during the early years of spontaneous settlement. The settler whose labor and capital resources restrict his ability to cultivate more than 6-8 hectares per year under traditional practices will have sufficient land to permit rotation of the cultivated area on a 7-10 year cycle, and at the same time have an adequate area be used for livestock pasture and the more permanent settlement uses. While it can be argued that a smaller average plot size will permit more intensive use of the project area (initially at least), 30 to 40 hectares has been determined to be a reasonable estimate of the land required to develop the agricultural unit that will result in long run, social and economic stability for the area as the campesino's farming operations evolve from today's primitive methods through stages of intermediate technology to a more modern scientific agriculture.

Two classes of larger farmers will be eligible for larger tracts of land: Profesionales described as individuals with formal training in agriculture and access to commercial credit will be allowed up to 150 hectares, and Empresarios described as commercial farmers or other large investors who can obtain up to 500 hectares.

To address the objectives noted below these larger tracts will be intermingled throughout the project area. In no case will they be located with frontage on the all-weather routes nor may the amount of land reserved for or distributed to the two types of larger operators exceed then percent respectively of the total project area. Title restrictions on the smaller campesino farm units will preclude for the medium term any expansion of the larger farm units through the purchase or acquisition of campesino farm units.

The dual system of farm sizes which mixes both large and small farm units will provide mutual benefits to both large and small farmers.[1/] Large farms will provide seasonal and part-time employment opportunities for underutilized labor and new migrants of the small farm sector and may be expected to assume a leading role in technological innovation which can accrue to the advantage of small farm operators not so inclined to assume risks associated with new crops and techniques. Such enterprises also contribute significantly, through their volume of production, to the basis for an earlier and expanded market for transportation, supply, processing and consumer services which in turn mobilize and attract to the area private capital and entrepreneurial talent. The designated location of these larger units nearby but off the all-weather routes is also intended to provide spillover effects to the benefit of the small farmers through their larger neighbors' greater capacity to provide significant inputs of capital and labor in improving local transportation and road facilities.

3) Identification and Assignment of Specific Land Parcels

The allocation of specific parcels of land to groups of small farmers, individual campesions, profesionales, or empresarios, will be in accord with detailed plans and guidelines established by the INC subject to the general provision that the most favorably located lands will be designated as nucleos and reserved for group settlement.

General plans have already been prepared by INC but the more detailed plans will have to be developed as the project proceeds taking into account details of topography, drainage and land cover which will become apparent as road construction, clearing of access trails, development of the cadastral survey and settlement itself proceeds.

1/ Both the IDB and Nelson Studies recommend strong consideration be given to the intermingling of farm sizes for most of the same reasons noted herein and the Bolivian experience in the Santa Cruz area further supports this approach. While this project encompasses no other substantive support to the larger farm units, in recognition of their potential contribution to area development and their location alternatives, the GOB considers it appropriate to offer the respective units at lesser than average market prices.

b. Land Titling Criteria

One of the major objectives for settlers in the project area will be to acquire a secure tenure right to the lands they have settled. Neither the Chané-Piray nor the San Julian areas have yet any basic cadastral survey control which is one of the major limitations to the early issue of land titles to settlers in the area. This will necessitate a major surveying and administrative effort by the INC which has responsibility for this function in the San Julián area.

While in the short run lack of formal recognition of ownership through land titles does not seriously limit development, land titles become of greater importance as intensity of settlement and land use increase and properties take on additional value. A marketable title also facilitates the transfer of ownership and can be pledged as collateral for long term credit. Secure tenure rights are specially important if farmers are to be expected to invest in capital improvements whose costs are recoverable only over a period of several years.

As a general rule requirements for secure land tenure in the newly developing areas involve meeting specific land development criteria in the process of "proving up". These development criteria vary according to plot size and involve a minimum amount of clearing and cultivation as well as the construction of other improvements such as fencing, house, buildings, etc. All of this is designed to show the good faith of the settler and discourage speculation.

The INC has established a schedule of land prices for the San Julian area ranging from $1.50 per hectare for campesinos settling on plots of 40 acres or less to $7.50 per hectare for empresarios who could obtain up to 500 hectares. Additionally some very general criteria requiring "development" and "settlement" have been announced which are progressively more rigorous as size of plot increases.

In the Chané/Piray area where settlement has already occurred tenure rights are possessory in nature, based on use and occupancy. This area falls within the jurisdiction of the National Agrarian Reform Service, and hence plans are being made to send a SNRA"mobile titling unit" into the area as part of the loan project.

While under present institutional arrangements, responsibility for delivery of the initial legal title for agricultural lands in Bolivia ultimately rests with the National Agrarian Reform Service (SNRA), the INC actually prepares all the necessary documentation for transferring title to the individual settlers in the colonization zones.

c. Cooperative Development and Small Farmer Organization

The group settlement concept discussed above will, in

addition to serving as a mechanism for transferring socio-cultural institutions, facilitate more formal community cooperation and group action programs. Likewise the settler orientation program has, as one of its major goals, to instill in the small farmer the need for and the advantages of group decision making and action. Within the MACAG, the responsibility for organizing and providing advisory support to agricultural cooperatives and precooperatives has been assigned to the SNDC. This agency is one of the participating agencies for this project; however, no specific funding for their activities is provided as part of this loan.

It should be noted, however, that a previous AID Loan - 511-L-044-has provided support for that agency, and SNDC's participation in the project will be supported in part by that loan. Their activities within the project area will consist mainly of organizing and assisting community self-help projects aimed at improving community infrastructure, constructing schools, access roads, village centers, local marketing facilities and similar low capital investment projects. SNDC will also play an important role in organizing campesinos into informal groups, pre-coops or cooperatives with a view toward improving marketing practices, access to credit and otherwise strengthening the bargaining power of the small farm sector through collective action.

d. The Proposed INC Institutional Role

The traditional colonization project in Bolivia[1/] has generally attempted to provide a broad series of production and social services which have been administratively and financially project-confined responsibilities of the related sponsoring agency. In 1965, when the INC was created and the direction of all public colonization projects passed to it, this same broad function was understood to be implicit in their enabling legislation. This role, while not fully excercised in all of the project areas, has led to a duplication of efforts in agricultural development, education, health, and land titling with the respective ministries and entities normally responsible for these activities, but who in practice have not been called upon to provide these services within the geographic limits of a directed colonization project. For example, in the Alto Bini Project, which is over ten years old and completely settled, the INC still operates an agricultural experiment station, provides extension and marketing services, has administrative and financial

1/ Reference is made only to the formal projects, all of which to date have been of the directed type. Support to spontaneous colonization has generally been only on an ad hoc basis.

responsibility for the primary education system, and provides part of the basic health services. Additionally, this broad INC role, which might have justification in remote pioneer colonization areas only, places an unnecessary series of administrative and managerial burdens upon the institution, fosters enclaves of excessive paternalism, and critically limits the capacity of INC to provide at least cost a series of limited and minimally essential services designed to maximize the long-run effectiveness of the rapidly growing spontanious rural migration into the Bolivian lowlands.

In 1973, the INC promoted a series of inter-ministerial agreements on a project by project basis which led to the transfer from INC of responsibility for selected public services in titling and health to those GOB entities routinely responsible. In March 1974 the new Minister of Campesino Affairs, Agriculture and Livestock further improved the realignment of INC functions which had been facilitated by the February 1974 merger of the Ministry of Campesino Affairs with that of Agriculture and Livestock. Finally, in April 1974 the GOB designated an inter-ministerial commission to (i) review and recommend improvements in the provision of basic public services to both directed and spontaneous colonization areas, (ii) plan a time-phased realignment of basic public service responsibilities in the directed colonization projects of Alto Beni, Chimore, and Yapacani which will permit INC withdrawal, and (iii) draft a revision of the INC enabling legislation redefining its institutional role (to preclude the unnecessary duplication of public services and achieve greater efficiency in the utilization of its resources).

d. Agricultural Marketing[1/]

As a general observation, aggregate demand for the various agricultural products which will likely be produced in the project area is sufficiently strong to absorb any incremental production without adverse price effects, either locally or nationally. Similarly, transportation, storage and processing facilities -- especially rice hulling mills -- in areas adjacent to the project are deemed adequate to handle the increased volume of production without undue strain or shift in their cost function. Moreover, observation and experience to date indicates a highly competitive structure of marketing services in the private sector of the Santa Cruz area with resiliency to expand both handling facilities and market territories to handle increased volume of produce as it emerges from the agricultural production sector. Marketing systems, in areas adjacent to the project area, though poorly developed by most modern standards, must be judged adequate on the basis of the induced response which has resulted in considerable immigration and agricultural development in the small farm sector over the past decade.

Construction of the two primary access roads will be the major factor in improving market performance in the project area. The primary effect will be felt in reduced transportation costs affording a higher net return to the producer. As an example, currently in the Chané-Piray area trucking costs vary from about 40 to 120 pesos per fanega (382 lbs.) of milled rice, dependent largely on the condition of the existing penetration road at the time of movement. Improvement of this trunk route will not only reduce operational costs of transport to near this lower level but will also encourage greater competition in the area to haul the farmer's product to intermediate or terminal markets.

Local product assembly functions will probably, as in other nearby settled areas, be performed by outsiders (rescatadores) until production volume is great enough to support a local assembler. As local areas mature through the pioneer and consolidation phases, more advanced assembly methods such as weekly marketing fairs may be expected to assume some of the assembly function. Ultimately, storage

---

1/ Material for this section is drawn from the unpublished Intensive Review Report of Dr. Louis F. Herrmann entitled "Review of Agricultural Policy. Prices and Marketing Related to a Proposed Sub-Tropical Land Development Project"-- Bolivia, March, 1974

processing and other more advanced marketing facilities will develop within the area. Initially, it is not anticipated that the agricultural service centers and their staff will assume any special operational role in product marketing other than acting as a clearing house for information and helping in the development of marketing co-ops.

Construction of additional sugar cane processing capacity near the project area would no doubt open another viable crop alternative and result in increased incomes to both large and small farm operators in the area. The same may be said of a vegetable oil processing facility which would improve market outlook for crops such as soybeans and peanuts. Investment in facilities such as these, however, must be considered on their own merits, and their location determined in the context of regional production advantages, rather than on the basis of investment in this project alone. The absence of such facilities cannot be considered a constraint on the economic viability of the project, and no correlative investments in agro processing facilities are required.

Within the project area, however, there will be need to develop and improve the distribution system for various agricultural inputs. This will become even more important as higher levels of production technology are adopted and particularly as livestock enterprises are integrated into the farming system.

The growth in the demand for purchased inputs is likely to be rather slow and the development of an effective private sector distribution system will probably lag rather than lead this demand. Therefore, it is here that the agricultural service centers can perform an important function, i.e., to provide facilities in the two sub-areas and, through contract arrangements or with private entrepreneurs, insure that the demand for farm inputs (seeds, tools, machinery, agrochemicals, livestock medicines, etc.) can be met. The important role of the service centers in providing short term credit to farmers will facilitate this additional role in promoting effective input markets. As mentioned earlier the service centers may also be an effective vehicle for improving the market for seasonal farm labor.

e. Land Clearing

It is not contemplated that any land clearing services will be provided under this project. Historically, land clearing has been accomplished by slash and burn techniques which are highly labor intensive. Capital outlays are confined largely to hand tools -- mainly the axe and machete. One of the major drawbacks of such a system is that land cleared in this manner allows only for hand cultivation at

least until the smaller stumps and root system rot or otherwise deteriorate. Such a tillage system makes weed control difficult and for this reason the usual practice is to abandon land to fallow after an initial two or three years in crop production. Three or four years hence the ground cover can again be burned and the land can be cropped once more. During this period of fallow the land can be used for grazing, although without a program to introduce native or improved grasses, the quality of forage is generally poor.

One alternative to hand clearing is to employ heavily capital intensive methods utilizing large crawler tractors to remove brush, trees and stumps. Such a system has the disadvantage of disturbing the upper horizons of the soil profile resulting in the loss of organic matter and fertility. While such a method accelerates the time at which mechanical tillage operations can be undertaken, it is also rather expensive at some $200 -- $300 per hectare.

Clearly, small farmers will have neither the ready cash nor access to credit to support even a modest effort to clear land mechanically. To undertake such a program on government account would likewise be prohibitively expensive,administratively cumbersome, and unnecessarily increase the GOB's investment per family.

Moreover, most small farmers will not have sufficient capital at hand to enable them to undertake mechanical tillage practices at such an early stage in the evolution of their farm development. At best their resources enable them to plant and harvest only 4-6 hectares per year initially and even this may often require that they hire supplemental labor at planting and harvest time.

The farm capital formation process is necessarily a slow one occuring over several years, but it also permits a gradual adjustment to more advanced levels of technology rather than having to absorb and understand what are often completely unfamiliar farming techniques and cropping systems in a short period of time.

For these reasons, it has been determined that no attempt will be made to provide project support for mechanical land clearing on a wide scale. This does not mean that some small areas might not be cleared mechanically in conjunction with other project activities involving road construction, well drilling or establishing group settlement centers in the nucleos described above. It should also be pointed out that although the project envisions land clearing to be accomplished mainly by hand methods, utilization of chain saws rather than the traditional axe will facilitate this process.

As noted elsewhere, one of the activities to be undertaken in the settler orientation program conducted under the aegis of the United Churches Group (UCG) involves training selected settlers in the use of single operator chain saws. In addition to facilitating an initial phase of the land clearing process, this alternative raises the interesting possibility that some income could be generated from the sale of commercial timber located on the settlers' claim. An especially good market for hard woods -- particularly mahogany and jacaranda -- exists in the Santa Cruz area some 90-120 miles distant. Representatives of the UCG have estimated that parts of the San Julian area may contain as many as seven mahogany trees per hectare. Even if this figure is optimistic by a factor of two or three it appears that the timber assets, if exploited by the settler, could provide a significant source of funds in lieu of credit or other governmental support which would hasten the capital formation process.

f. Agricultural Credit

Because most new settlers appear to have little in the way of attachable assets and have not yet established a secure tenure in their new land which would provide surety for a loan, generally they are not considered credit-worthy according to commercial banking standards, and the commercial banks in Bolivia (as in other developing countries) have not developed a large clientele among small farmers. In part for this same reason, the Banco Agrícola de Bolivia (BAB), whose charter is to provide credit to the agriculture sector, has not made many loans to individual small farmers. Moreover, because campesino farmers require smaller loans and also need some supervision of management, the administrative cost per loan is higher than for larger credits. Since interest rates are carefully controlled through the central banking system's implementation of the GOB's more general monetary policy directives, the higher administrative costs of loans to small farmers cannot be passed on through increased interest or service charges. From the banker's point of view, very simply, small farmer loans are not profitable under current liquidity and pricing constraints in the banking system.

One method to increase loan efficiency - both in terms of reducing administrative costs as well as lowering the risk of default - is to make loans to groups of farmers rather than to individuals. These groups can be formally organized co-ops, pre-co-ops or informal groups of farmers who jointly pledge repayment of the loan. Given the importance attached to the group settlement concept in the project and the emphasis on developing mutual interdependencies among settlers, group credit is seen as the most advantageous approach to agricultural credit delivery.

Under this project, funds for a credit program will be provided to the BAB who will establish branch offices in each of the two agricultural service centers. The use of these funds shall be limited to the project area and priority will be given to group loans for small farmers as indicated above. Under an agreement to be worked out between the BAB and the MACAG, agricultural extension and SNDC cooperative development personnel will be utilized to assist borrower groups with developing loan requests and to advise the BAB on the technical soundness of the loans. To the extent required, the agricultural extension staff will provide farm management assistance and supervision of the loan clients and keep the BAB informed concerning facts which may alter the agreed-to loan disbursement plan or present the possibility of default. These extensionists, together with other local representatives, shall act as an advisory committee to the local bank manager. Responsibility for collection of loans shall be held by the BAB. Accordingly, final responsibility for credit judgement will rest with the BAB.

Formalization of a mutually satisfactory agreement between the BAB and MACAG in accord with the above will be a condition precedent to disbursement of the loan funds to provide this credit.

g. Education Facilities

Primary and secondary education has been identified as services which rank high among the social investment priorities of campesinos. Generally campesino migration is initiated by the head of the family moving alone into the settlement area. Later, often after several months or even years, he is joined by his family. This generalized behaviour suggests on the one hand that since children do not accompany the settler the establishment of primary and secondary schools can be delayed a few years until the school age population in the new developing area is sufficient to warrant public expenditures to establish schools. On the other hand, provision of schools would serve as an incentive to early migration of the whole family which presumably would also bring resources and savings which would accelerate farm development. The evidence on this point is not clear and one of the early evaluation objectives will be to determine at what stage in the new lands development process investment in primary and secondary education facilities will be optimal.

No direct inputs from this loan are planned for primary and secondary education. However, it is planned that resources of SNDC will be directed toward school construction on a self-help basis in selected centers. The Ministry of Education will be responsible for

providing teachers and materials for the operation of the schools. An interagency agreement will be developed to insure that that Ministry will commit sufficient budgetary resources to provide such educational services.

Another important aspect of the more general education services is adult education. This will be provided mainly through the operations of agricultural service centers discussed above. The Agricultural Extension Service, SNDC and representatives of the Ministry of Health will have important responsibilities for the content of adult education program and will commit their resident personnel to the support of this activity.

h. Characteristics of the Typical Campesino Migrants 1/

The typical campesino settler is a spontaneous migrant who made his decision to move in response to economic pressures and incentives. Often he has spent one or more seasons harvesting sugar, cotton, or rice in the oriente and thus has familiarity with the agricultural situation there. Almost always he is a farmer with several years of agricultural experience in his upland rural community.

As a rule the settler is in his early thirties. About 50% of the heads of migrant families are literate although most have no more than 3 years of schooling. Generally the migrant will be bilingual, speaking Spanish and his native Aymara or Quechua tongue. Being young his family is generally small, i.e., five or less, and it is not uncommon to find a significant proportion of settlers in new areas who are unmarried. Generally, the initial act of settlement is made alone. Later when the settler has planted a crop and build a basic shelter, he will be joined by his family which often includes a parent or unmarried brother.

The campesino migrant often has considerable savings which he uses to get through the initial months before his first crop matures. Unpublished data developed by a former director of INC for his doctoral dissertation at the University of Wisconsin estimates the cash resources initially brought into the settlement area at $150 to $250 per colonists. It further indicates that this campesino class generally has other savings from prior production activities, earning as a harvest laborer, and in the form of livestock. Thus, this migrant class is not destitute or without initiative and confidence that it can successfully start a new life away from its traditional but static home community.

1/ This section draws heavily on the field surveys reports of Graber, Keller and Aitken, and Royden and Wennergren cited elsewhere.

B. Relationship of Project to Sector Strategy

1. Summary of Sector Assessment[1]

a. Sector Goals

In addressing the development of Bolivia's agricultural sector the GOB has two basic goals.[2]

1. To increase the per capita income of the rural population as rapidly as possible based on increased productivity in the sector (This emphasis on increased production is basically concerned with improved economic efficiency in production of food and fiber both for consumption requirements and export. While couched in economic terms this goal also encompasses concern for health, education, and other basic needs of the rural population); and

2. To obtain a more egalitarian sharing of the fruits of this economic progress so that increases in income are not concentrated in the hands of a few individuals. (This goal is concerned with integrating the relatively poor campesino into the market economy in order to: a) broaden and deepen the internal market; b) utilize the production potential of the small farm sector as part of the basis for more rapid economic growth; and c) minimize the possibility of political and social unrest through maintaining a stable investment climate.)

USAID concurs with these two broad goals for sector development. To the extent possible, however, we wish to allocate agricultural development resources so that both goals can be addressed simultaneously i.e., direct a significant portion of USAID inputs into increasing the productivity and per capita income in the large but relatively poor campesino sector

b. Positive Factors and Principal Problems Affecting the Sector

The Office of Planning, MACAG, and USAID have recently collaborated in preparing an assessment of the agricultural sector to determine positive factors and problems affecting progress in the sector

---

1/ The description of the sector and its historical development are presented in the DAP.

2/ From a speech by Hugo Banzer Suarez (President of Bolivia) January 1, 1973 and MACAG's Sector Assessment, which is still in process.

(given the objectives of rural and agricultural development) and for determining a set of appropriate sector development strategies. Although the sector assessment has not yet been completed, it is far anough advanced to be able to say that there is general agreement on positive factors, problems, and a preliminary sector development strategy.

The positive factors upon which the sector strategy can be built include the following:

1. An impressive natural resource endowment, with significant amounts of underdeveloped land and water resources in a wide variety of ecological zones;

2. An emerging class of campesino producers with entrepreneurial talent who feed themselves and 1/3 of the urban population and who increasingly demand products of the non-farm sector;

3. A satisfying record of returns to prior basic and adaptive research (when well staffed and financed), involving Bolivian scientists and institutions in diverse regions of the country for a limited number of selected crops;

4. The GOB committment to education and strong interest in improving primary and secondary education and university programs related to agriculture;

5. Extremely strong world demand for food and fiber products of all regions of Bolivia which have increased the profitability of producing both export and import-substitute crops in both commercial agriculture and the campesino sector and which have given new status to agriculture as an efficient investment alternative for both public and private resources;

6. The demonstration effect in the rest of Bolivia of successful agricultural development in the Santa Cruz area;

7. The responsiveness of farmers in all regions to economic incentives as signaled by market forces. This is evident in the commercial agriculture of Santa Cruz, the campesino sector in all regions with its emerging entrepreneurial class, and in the trends toward biological-chemical innovations in the highlands and mechanical innovations in the lowlands; and

8. A movement to consolidate and improve public sector services for agricultural development.

The major problems restricting achievement of the stated GOB goals are as follows:

1. A stagment technology and deficient scientific base, especially in the small-farm sector, characterized by inadequately financed and uncoordinated public services in research, extension, other technical services, and related social services;

2. Poorly developed factor and product markets characterized by high cost and limited availability of modern inputs for agricultural production such as fertilizers and chemical supplies improved seeds, credit, tools and machinery, harvest labor, etc.; a lack of information on prices and availability of both inputs and products; no rural cadastre; heterogenous weights and measures; deficient market access roads with respect to number and quality; unenforced or non-existant standards for grading and maintaining product quality; lack of storage and marketing credits; tenure laws which seriously limit the land market; and lack of group organization for production and marketing by campesinos;

3. Insufficient human capital at general, technical, university, and post graduate levels of education. The high drop-out rates at very young ages results in a largely illiterate unproductive rural labor force. The technical and university graduates are much more deficient with respect to quality of their training than to their numbers. There is almost a complete absence of senior scientists for managing and working in public services to develop a scientific agriculture, including the university system;

4. Low relative salaries for technicians and professionals working in the public sector serving agriculture vís - a-vís other public and private sector jobs, both nationally, and internationally;

5. Poorly organized public services serving agriculture with duplication of services among various agencies, most operating budgets going for salaries in central offices rather than for carryin programs to rural people, major program emphasus being directed to modern agriculture of the oriente on programs that compete with the private sector, and lack of a data base especially for the campesino sector to support efficient public programming for agricultural development;

6. General development policies that restrict progress in agriculture including: a) a system of internal transportation taxes on movement of agricultural products; b) fixed prices on food products of primary necessity which tend to lessen the incentive to increase production and distort efficient use of resources, and c) import substitution policies that tend to focus on consumer durables and ignore production of inputs for agriculture such as nitrogen fertilizers; and

7. The continued lack of sufficient public support for development of the small farm sub-sector. More than 80 percent of the budget devoted to agriculture between 1967 and 1973 (not including education or transportation) has gone to CBF production activities, many of which compete directly with the private sector or to BAB credit programs to the large farm sector in Santa Cruz. The balance has averaged less than 2 percent of all public expenditures at both centralized and decentralized levels.

As a result of the problems set forth above, Bolivian agriculture is increasingly characterized by a dual economy of fairly rapid development of a modern agriculture in Santa Cruz, and to a campesino sector comprising most of the rural population that is only slowly being integrated into modern economic life . Failure to overcome such problems has resulted in an increasingly serious minifundia problem in the highlands as the rural population of the regions has become increasingly concentrated on the limited land base. The result is low and declining levels of productivity, family income, and nutrition and an inelastic supply responses in the Altiplano and valleys in the face of strong demand pressure.

c. Strategy for Agricultural Development

A general strategy for agricultural development has been proposed by the Office of Planning, MACAG, to attack the problems set forth above. This strategy is generally agreeable to USAID, although it has not yet been formally adopted by the GOB. However, it is unlikely that the final approved strategy will differ from that now being planned for in MACAG. Following GOB adoption of the MACAC proposed strategy, a USAID evaluation will be reflected in the Mission's internal agricultural sector assessment. Formalization of the GOB's strategy and completion of the Mission's agricultural assessment is expected to be completed within 30-60 days. The Mission's Sector Assessment will also include the Mission's proposals for the support of the GOB strategy, taking into account the plans of other principal donors.

A principal component of the strategy is to shift the production function for the campesino sector by developing through increased public services a scientific base relevant to its needs and by encouraging it to adopt a more efficient utilization of the natural resource base. This is to be accomplished through the proposed development of agricultural service centers for each major ecologic zone of the country. Such centers are to provide the basic public services to support development of a scientific agriculture including research, extension, and other technical services. It is expected that regional primary and secondary education activities will be correlated with each center, and as appropriate that technical and university education will be integrated with

such centers with the professional staff of local universities doing research at the centers and students in both technical and university courses receiving practical experience at the stations.

Another principal component of the strategy is to provide public services to strengtehn factor and product markets including assistance in obtaining marketing information, credit for production and marketing, support for the formation of farmer cooperative organizations, more agile land titling, and possibly facilitating the sale of modern inputs. The agricultural services centers will play a major role in the provision of these services as well. The strategy also envisions the undertaking of several projects to strengthen factor and product markets besides the agricultural service centers, including the development of farm-to-market access roads, storage facilities, a rural census and development of an ongoing system of data collection, a rural cadastre, and standards for grading and maintaining product quality.

A third principal component of the strategy is to improve the amount and, above all, the quality of human capital available to the sector. At the primary and secondary level this involves developing a curriculum that is more in line with the needs of the majority of rural people. At the technical and university level the recommendation is to produce a much more highly qualified graduate by improving the staff and curriculum. The strategy strongly recommends the GOB recognize the high return to investment in human capital and increase salaries for technicians and professionals in public service to levels competitive to the rest of the public sector and the international job market. This is necessary for improvement in the university and technical education system, and to develop other public services to support a scientific agriculture. Until substantial progress has been made on this component of the overall strategy a significant portion of the human capital to help manage and provide technical inputs to such centers will initially be imported by the GOB under technical assistance contracts. Financing of such contracts and initial construction will be sought through foreign donor assistance.

Finally, the strategy recommends changes in the set of GOB policies which now limit production responses in agriculture i. e. eliminate the system of internal customs posts, reduces taxes on import of inputs and exports of agricultural products, and remove fixed prices on agricultural products. It also envisions a reorganization of the public services for agriculture with special emphasis on improving the Ministry's capability to analyze and set overall policies for the sector while emphasizing decentralization in implementation and development of an efficient organizational and administrative system for the agricultural service centers.

2. Project Rationale

The basic purpose of the project is to find a way to address the imbalance of people and land and to increase the likelihood that small farmers would be able to participate in the effective integration of new lands in the oriente which at present offers the greatest long run potential for increasing Bolivia's agricultural production. Thus, it addresses both major sector goals of the GOB. It will provide the first application of the strategy elements to under utilized land while the application to the more developed areas is being planned for on a wider scale. Indeed this project, with its major focus on development of farm-to-market access roads (to address factor and product market improvement) and agricultural service sub-centers (to address the technology base) embodies central elements of the strategy outlined above.

This project is designed to improve the efficiency of the growing spontaneous migration from the overcrowded highland by attacking the problems which are partially responsible for perpetuating the current inefficient distribution of human resources. The construction of farm-to-market access roads in the project area will help to improve the efficiency with which factor and product markets function in this region. Further, development of these access roads warrant consideration among those of the highest priority in the country, given the production potential of the area, its extensive land base, the farm population already in place, and a large market center nearby (Santa Cruz).

The provision of public services through the proposed agricultural service sub-centers will help to build the scientific base of the region and promote a more stable and productive agriculture in accordance with the general development strategy outlined above. The education services and development of potable water supplies are also directly complementary to this process. Finally, the implementation of a process for encouraging the transfer of social-cultural institutions is necessary to encourage group action and more rapid migration. While not specifically referred to in the sector strategy, all available evidence suggests this is a critical component in successful settlement of new lands.

There are three principal effects to be achieved from implementing the proposed project. First, the gross output of the agricultural sector and the domestic economy would be increased. This would result from the migration of 5,000 new families from the highland to the project area, each with an estimated increase of $575 in net family income or production

within five years after their arrival. Even assuming that there is no advance in production technologies, this occurs as a result of both the increased land resources brought into production and from higher levels of employment of labor resources. To the extent that new technologies can be developed and are adopted, the agricultural sector output can be further enhanced. At the same time, the net family incomes of 6,000 families already in the project area would also increase by an estimated $483 within five years after the road is completed due to improved market access, and changes in crop mix and techniques. The net result of increased migration and market acces is an increase of $5.2 million in GNP, affecting 11,000 families in the small farm sector. The increment to annual net income is expected to increase after the fifth year.

Second, within the context of these productivity increases the aggregate mix of production for the country as a whole is shifted in favor of crops that can be produced in the oriente. Many of these products are currently in short supply domestically or have considerable potential for sale in export markets. Increased production of various products : such as rice, corn, sugar, beef, and perhaps wheat will contribute to domestic food availabilities, and some of these could become important earners of foreign exchange for Bolivia.

Third, the level of income of campesinos in both regions of the country tends to increase. In the oriente, these increases may be attributed to a higher marginal productivity of labor of migrant farmers on the more extensive land base. In the uplands, average income levels tend to improve ceteris parabus because fewer people are left to share in the production accruing from the limited land resource base. Also, recent experience in settling the oriente suggests that increased agricultural production generates a vigorous demand for temporary labor, especially during the harvest season for cotton, sugar cane and rice. This demand has given rise to a substantial seasonal migration of campesino laborers from the highland to the oriente for 3-6 month periods and is replacing a prior practice of seasonal migration to Argentina. This not only provides improved employment opportunities for campesinos from the Altiplano and valleys during their slack season, but in addition the income transfer occuring with the repatriation of earnings is a positive factor in ameliorating regional income disparities within the country. This seasonal migration to the oriente by the campesino often leads to their permanent settlement at a later date, as they are better able to assess the opportunities and risks associated with migration. Again the analysis in Section II, C below suggests the impact of the project will be substantial.

C. Project Background

The purpose of this section is to: a) briefly describe and characterize colonization efforts in Bolivia since 1952; and b) summarize the findings of various evaluations of Bolivian colonization with respect to the key factors affecting success and failure. There are several excellent studies of Bolivian colonization activities which are the source material for this section and to which the interested reader is referred for more detail.1/

Evaluations have been generally consistent on three major conclusions. First, access to markets, and viable social-cultural institutions are both necessary for the successful development of new lands. Second, directed colonization projects, despite their high costs and structured support, are no more successful than spontaneous colonization in terms of attracting and keeping colonists, although the reasons cited for this vary. Third, despite the relative success of spontaneous colonization only a little more than one fourth of the increase in population on the Bolivian highlands has migrated to new lands areas in the past 20 years.

1. History of Recent Colonization

After the revolution in 1952, the eastern lowlands received greater attention in the development strategy of the country. Since the lowlands were so sparsely populated, migration from the highlands was to play a key role in development of the agricultural sector. The three main objectives to be achieved were:

1/ Studies of Colonization in Bolivia include: 1) Michael Nelson, the Development of Tropical Lands (Baltimore): John Hopkins, 1973, 2) Gordon N. Keller and Percy Aitken, Socio Cultural Factors in Colonization In Bolivia", Utah State University Series La Paz, 14/74 3) Kelso W. Wessel, "The Profitability of Small Farms in Bolivia", Cornell University, International Agricultural Development, Mimeograph 27, April, 1972: 4) Kelso Wessel, "An Economic Assessment of Pioneer Settlement in the Bolivian Lowlands," unpublished PhD dissertation, Cornell University, 1968; 5) Inter-American Development Bank, "Evaluation of Tropical Colonization Projects in Latin America." Papers on Agrocultural Development No. 7, Washington, D. C. 1970: 6) Thomas Royden and Boyd Wennergren, The Impact of Access Roads on Spontaneous Colonization Chane/Piray Area of Santa Cruz, Bolivia, Utah State University Series 23/73 Logan, Utah, 1973; and 7) Frederick Fiester, "Colonization in Bolivia, Montero 1971. (Mimeographed).

i. the equalization of the distribution of the rural population with respect to land resources;

ii. the diversification and increase of agricultural production by promoting the cultivation of tropical and sub-tropical crops such as rice and sugar; and

iii. the populating of frontier zones and remote areas, thus promoting their integration into Bolivia's economic life.

Until 1965, there were several public and quasi-public agencies or groups involved in directed colonization projects, with little coordination between them. These included: the National Resettlement Agency of MACAG, the Ministry of Defense, the Bolivian Development Coporation (CBF), and various religious missions. External financial assistance to these national entities was provided by the Andean Mission of the United Nations, the Interamerican Development Bank (BID), and USAID.

The National Resettlement Agency was mainly involved in the legal aspects of colonization such as determining areas to be settled and awarding and registering land grants. The Ministry of Defense and CBF were involved in the actual implementation of GOB colonization projects with financial and technical assistance from United Nations, USAID, and various religious orders. Groups of foreigners were allowed to immigrate to colonization areas by the GOB; however, most assistance to these migrants was provided by the foreign government or sponsoring group.

In 1965, all governmental agencies concerned with colonization were centralized in the Instituto Nacional de Colonización (INC). This agency became responsible for coordinating all colonization (both directed and spontaneous, public and private), and for providing technical assistance to all colonies. It was initially part of the MACAG, and is currently an autonomous public institute under nominal control of the current Ministry of Campesino Affairs, Agriculture and Livestock.

a. Directed Colonization

The first stage of GOB sponsored colonization since the 1952 revolution was initiated in the Santa Cruz area. The first colony, Cotoca (1954) under the direction of CBF, received extensive assistance through United Nations financing. This highly directed, paternalistic approach to colonization was based on a governmental preoccupation with the environmental hardship of the tropics which, it was thought, had precluded even the Incas settling the region. Consequently, in Cotoca,

the land was cleared in advance for the settlers and a monthly subsidy, housing, medical attention, credit, technical assistance and community services were provided. The principal crops put into production were rice, corn and sugar cane. The program had a substantial cost (US$3,350 per family), but was not successful in resettling families since it suffered an abandonment rate of over 75%.1/ Several reasons are cited for failure of this project including the lack of access to markets and the lack of economic viability to the production in the absence of the government subsidies. When the substantial government assistance ceased, many settlers abandoned the project.

Colonization without external financing was tried next in the Santa Cruz area under the direction of CBF and the Ministry of Defense. While the level of assistance was lower than at Cotoca, it was still relatively high. Colonies developed under this system included Aroma (1954), Huaytu (1954), Caranda (1955), and Cautro Ojitos (1956). These colonies were also initially unsuccessful with high rates of abandonment (50-70%) for the same reasons that affected Cotoca. However, the development of a paved access road in the late 1960's has made some of these areas economically viable. For example, the net average family income in 1971 was $1,052 at Cuatro Ojitos, and $1,124 at Aroma apparently because of access to Santa Cruz markets afforded by paved roads which run through or very near to the former two colonies.2/ In contrast the same study reported average family income at Huaytu, which did not have the same access, was only $422. While the access roads helped increase the population of Cuatro Ojitos from around 500 families in 1960, to a high of 1,200, the recent drought adversely affecting the potable water supply has reduced the population to a level of about 800 families. Aroma has had a similar experience losing more than 200 of a total of 300 families due to the drought. Thus, although the access road brought prosperity to these two old colonies, lack of potable water has reduced the population. The recent installation of a potable water system in Cuatro Ojitos is expected to encourage an increase in the population back to around 1,200 families

During the same period of time, the CBF and Ministry of Defense developed colonies including several groups of foreign colonists,

---

1/ Instituto Nacional de Colonización, Banco Interamericano de Desarrollo, Programa de Colonización, Informe Final, La Paz, Bolivia 1970 p.2

2/ Kenneth S. Graber, Agricultural Life in the Colonies, Methodist Church in Bolivia.

who immigrated to the Santa Cruz areas. These included three separate groups of Okinawans (1954, 1958, 1963), a group of Japanese (1957), and a group of German descended, Paraguayan Mennonites. With the exception of the Mennonites, these groups were sponsored by either their host government or other foreign groups, and received assistance from the group that sponsored them. They also apparently benefited from GOB assistance including production credit loans as well as land. In contrast to the directed colonies of CBF, there has been almost no abandonment of foreign colonies. These colonies also were directed and lacked access to markets, etc., but had two features that distinguished them from CBF colonies. The first was the presence of traditional social-cultural institutions which greatly reduced the risks associated with migration and led to the cooperative organization of production and marketing activites and the utilization of more modern factors including credit. The second was the consistent presence of resident agronomists who developed experiment stations for crops to be produced in the colonies. Consequently, technical levels of production are much higher in the foreign colonies than in the GOB colonies. The result is more stable and productive agriculture in the foreign colonies, due in large measure to the early adoption of more modern techniques or production.

The second stage of GOB sponsored colonization began in 1961 when CBF undertook a new era of directed colonization with major projects located in three separate regions of the country. These projects were in the Alto Beni area located in the Yungas of northern La Paz Department, the Chimoré area located in the Yungas of Cochabamba Department, and the Yapacani area located in the sub-tropical lowlands northwest of Santa Cruz city. The long run goal of these projects was to resettle 100,000 families, through directed and spontaneous colonization, from the highlands in ten years.1/

In 1961, CBF obtained a loan of US$9.1 million from IDB for the purpose of resettling 8,000 highlanders in the three project areas mentioned above. The actual resettlement was to start in latter 1963. Financing of $1.2 million was also provided by USAID for opening up 636 parcels of 10-12 hectares each in the Alto Beni. These areas became known as the Alto Beni 1 project. The CBF-USAID project (Alto Beni I) was incorporated into the CBF-BID program in 1963 and two new project areas opened in the Alto Beni. By 1963, 562 families had been resettled in the Alto Beni 1 project at an average cost per family of approximately US$2,500. Nine hundred and thirty one hectares of new land were

---

1/ Junta Nacional de Planeamiento, Planeamiento, La Paz, Bolivia, 1961, pp. 164.

put in crop production, mainly in rice, corn, bananas and yuca.[1/] However, by 1965, only 754 colonists were in CBF projects in the Alto Beni. This was a net addition of only 192 colonists in the CBF-IDB project areas although CBF had developed plots of 12-18 hectares for about 900 more colonists.

The Chimore colonization project began in 1962. The plan envisioned the resettlement of about 4,000 families, the development of an internal road system, community centers with each family receiving a plot of approximately 20 hectares along a road, and transportation for the colono and his family to the colonization area, with provision of food, clothing and tools on a credit basis until after the first harvest. The project, however, was never able to meet schedule in any of its phases, and by 1968 only 402 families were living in one community center and 118 families had already abandoned the colony. The settlement of the Yapacani project proceeded on a similar plan, but with the help of the military for pre-colonization work. This project was much more successful however, with the presence of 1,179 families in the project as of 1965.

The Bolivian Government was unsuccessful in meeting its goal of quickly resettling 8,000 families in the three directed projects since as of 1965, only 2,335 colonists had been resettled into these three projects.

The third stage of GOB colonization efforts began in 1965 when direction of all public colonization projects passed to INC. The development of the three project areas of the second stage continued under IDB financing and with USAID loans of approximately US$12.1 million for construction of access roads between Yapacani-Rio Víbora, Santa Ana-Covendo and Caranavi-Santa Ana. The objectives of the program were similar to those of earlier programs except that recognition was given to the role of spontaneous colonization. These objectives were:

1. To transplant rural people from the densely populated highlands;

2. To increase and diversify the agricultural production of the country; and

---

1/ A.I.D. loan funds were used for a hospital, schools, offices, credit, land clearing, etc., and a road of 73 kilometers from Caranavi to Puerto Linares. The cost of US$2,500 does not include the cost of the road.

3. To serve as an incentive for the settlement of a large number of spontaneous colonists on the periphery of the projects.

Only 8,717 additional families settled in the three projects during the period 1965-69 according to the final report of INC-IDB.[1] The same report indicated that the average cost per family in the three INC-IDB projects was $1,605. At this cost the total GOB investment necessary to relocate 100,000 families through the directed colonization process in the 1961-1970 period would have been about $160 million, clearly beyond the fiscal possibilities of the GOB.

Between 1961 and 1970, 11,170 families migrated to government colonization projects (8,717 INC-IDB, 1,891 CBF-IDB, and 562 CBF-USAID). Only an estimated 6,238 families were on all directed colonization projects as of 1973,[2] however, this includes those in the older Santa Cruz projects. Thus, at least 44 percent of the people settling on GOB directed projects during the 1960's abandoned their plots. The main reasons given for abandonment were lack of market access, poor land, the desire to escape project related debts, and illness.

b. Spontaneous Colonization

In contrast, spontaneous migration to rural areas of the oriente was much greater, especially during the 1960's. More than 42,000 families of spontaneous migrants lived in the three major colonization areas as of 1973. It is likely that GOB investments in directed colonization were at least partly responsible for this migration since most spontaneous colonists live in the general areas of the directed colonies, but tend to be located near market access roads. Conclusive evidence on this point is lacking. To the extent GOB investment in directed colonization has precipitated spontaneous movement, the average cost per migrant is greatly reduced.

Detailed evaluation of the process of spontaneous colonization is limited to studies of the Caranavi area in the Yungas of La Paz, and the Chapare area near Cochabamba. The Caranavi area has been subject to two studies, one by the Ministry of Planning and

---

1/ INC-IDB, Programa de Colonización-Informe Final, La Paz, 1970.

2/ Unpublished data, INC.

Coordination (MINPLANCO) 1/, and the other by IDB 2/, both in 1970. The IDB also studied three other areas of spontaneous colonization in Latin America. Nelson (who was part of the IDB study team) also reported on spontaneous colonization in the Chapare in his recent book, which was based on the IDB report. 3/

The detailed MINPLANCO study of the Caranavi area reports several negative aspects of spontaneous colonization including: a) spontaneous colonizers tend to occupy marginal land both with respect to quality and a viable infrastructure; b) abandonment is high, particularly in the pioneer stage; c) there is a tendency to transfer a subsistence economy from the highlands to the lowlands and the campesino is not able significantly to increase his productivity and income; d) there is an absence of GOB technical and social services which also restrict the campesino's productivity and income; e) there is a lack of integration with market centers, due principally to the lack of commercial organization among the campesinos; and f) spontaneous colonization tends to be a seasonal phenomenon, with colonizers moving back to highland areas or hiring out as migrant laborers during part of the year. The major positive factor of spontaneous colonization isolated in this study was the presence of ethnic homogeneity among spontaneous colonizers with the presence of traditional socio-cultural institutions that facilitated permanent colonization. This appears to derive from the tendency for most spontaneous settlements to be composed of people either from a common geographic origin or of common ethnic or cultural background.

The findings of the more global IDB and Nelson studies are somewhat more positive in tone. For example, both Nelson and IDB find in studying Caranavi, Chapare, and other areas of spontaneous colonization in Latin America that viable agriculture and urban centers have generally been established within dynamic regional economies. Also

---

1/ This report is summarized in Instituto Nacional de Colonización "Proyecto de las zonas de Colonización", Vol. I, La Paz, 1974, pp. 28-30 (typewritten).

2/ IDB, "Evaluation of Tropical Colonization Project in Latin America" paper on Agricultural Development N° 7, Washington, D. C. 1970

3/ Michael Nelson, The Development of Tropical Lands (Baltimore: The Johns Hopkins Press, 1973) pp. 103-110.

the spontaneous colonizers have achieved stability and sufficient political leverage to induce the GOB to begin to provide needed social and production services. A principal factor in the success of spontaneous colonies appeared to be their access to a market center provided by a road.

The findings of the IDB and Nelson reports thus make suspect some aspects of the generalizations in the limited MINPLANCO report. While spontaneous colonizers do occupy marginal land, lack infrastructure, and practice a primitive slash and burn agriculture that wastes natural resources, one of the distinguishing characteristics throughout Latin America of the spontaneous colonizers who have achieved success has been their strong participation in a viable market economy. They are not subsistence farmers in the traditional sense of the word as they sell a significant share of their output in the local market, hire labor for peak needs, etc. The evidence also suggests income and productivity of spontaneous colonizers is much higher than in highland areas, accounting for the relatively large level of such migration in recent years.1/ Then, too, the more seasonal occupancy of new lands is probably more prevalent in those areas of high seasonal labor requirements such as Alto Beni and Santa Cruz for the related coffee, rice, cotton or sugar cane harvest. Such phenomenon is not necessarily negative since for many campesino families it represents a low-risk intermediate step in their transition to the lowlands.

In any case the IDB found spontaneous colonization to have enough positive attributes that it recommended priority to be given to consolidation of areas of successful spontaneous colonization (i.e. provide needed infrastructure to increase productivity and income in areas of proven economic viability). Second priority was to be the development of access roads in new land areas, near major market centers, with specific reference to the North East of Santa Cruz. Another recommendation was for a "feed back" or monitoring system so adjustments to project design could be carried out in a timely fashion.

c. Net Effects

Despite the relative success of spontaneous colonization, internal migration to the lowlands has failed to alleviate the increasing population pressure on the Altiplano and Valley regions. During the period 1955-73, it is estimated that the rural population of the highlands

---

1/ Kelso Wessel, "The Profitability of Small Farms in Bolivia", Cornell University, International Agricultural Mimeograph 27, Ithaca, New York, 1972, (Mimeographed).

increased by 180,000 families after rural-urban migration. (Rural population of the Altiplano and Valleys was estimated at 2.8 million in 1972. If it grew at an annual rate of 2.3 percent it was 1.8 million in 1955. This is an increase of 700,000 people or 180,000 families at 5 per family). Thus the out-migration of an estimated 48,238 families is a little more than one fourth of the increased population of the highlands. Even allowing for an error of estimation of 100 percent for the relatively important spontaneous colonization, the highlands have still experienced rapidly increasing population pressure.

Through the directed and spontaneous resettlement efforts, Nelson's study estimates over 105,000 Has. of new land had been brought into cultivation by 1967-1968.INC's unpublished reports indicate that this has more than doubled by 1973. Available data on the gross product of this sub-sector is not available, however unpublished MACAG estimates place it in the range of $28 to $30 million in 1973. More specifically it is known that essentially all of the coffee, cacao, and rice production is produced by this sub-sector plus significant amounts of the fruit and cane production. The estimated 1973 production of the first category (coffee, cacao and rice) is valued at approximately $14 million.

2. Findings and Conclusions

What factors have determined the limited success of the GOB directed colonies and the apparent greater success of spontaneous and foreign colonization? There are apparently six main factors which are of critical importance in determining project success, all of which are necessary if maximum results are to be achieved.1/ These include:

1. The presence of an all weather access road - This feature was cited as a critical factor in the abandonment of land on most GOB sponsored colonization projects. In contrast most spontaneous colonization has occurred along such roads, and foreign groups have built and maintained their own roads.

2. Location of production in response to market forces - This is closely related to the access road but also includes the consideration of market forces in selecting production sites. GOB projects have tended to be located in remote areas, particularly in the early colonies. As a result, economic returns have too often not been great enough to permit the amortization of debts incurred by colonists in the directed

1/ Similar factors have been identified as limiting colonization in other Latin American countries. See Nelson, op. cit.

projects. In contrast, the spontaneous colonizers have responded to natural market forces; thus, other things equal, their production is likely to be more profitable. While the foreign groups may be somewhat more isolated, they are more strategically located than the GOB colonies.

3. The presence of social-cultural institutions which reduce the risk associated with migration - The GOB colonies did not provide for the transfer of such institutions: new colonos were completely on their own, having left behind traditional institutions to deal with problems associated with production (e.g. the aini an Indian labor exchange institution). Further, the project planners were either unconscious of this problem or minimized its importance. In contrast, the foreign group brought all their institutions with them and thus had a more secure and safe environment, even in the face of new obstacles. While the spontaneous colonizers did not have these institutions, new institutions to replace the old seem to develop much faster among the spontaneous colonizers than among colonos on GOB projects.1/

4. The economic viability in production - This is an important factor which may have been overlooked in much of the literature on colonization. In actual practice, there have been three general levels of technology in the colonization areas of Bolivia. One is the slash and burn technique used by most spontaneous colonizers who are limited to hand labor and must use such techniques to bring jungle land into production. Rice has been the principal market crop grown because of the strong demand and a government price support program which in combination with the relatively short growing season guarantee a quick cash return.2/ Since dryland rice is sensitive to weed competition and lack of soild nutrients, the farmer must either invest in weed control and artificial fertilization of rice land to maintain yields in the third or fourth years or go to more permanent crops such as cane, bananas, or pasture or move on to new lands. The last choice seems to be the one taken by most spontaneous colonizers, who have no access to modern factors of production and a more stable agriculture but do have access to more land in the same general area. This suggests slash and burn agriculture yields the highest return to the spontaneous colonizer who is not able to incorporate more modern factors in this production process.

1/ See Gordon N. Keller and Percy Aitken, Socio Cultural factors in Colonization in Bolivia. Utah State University, Series 14/74, La Paz 1973.

2/ Other crops are grown for subsistence.

The second level of technology is reflected in that achieved by some colonos in GOB projects who have managed to adopt some modern factors of production and develop a more stable agriculture. In such projects, land area is generally limited to 15 to 20 hectares per family. After three or four years, when the higher level of nutrients decreases and weeds begin to take over, economic forces may dictate the abandonment of the GOB plot (and the project) if the colono has not been able to incorporate more modern factors into his production process and thus move to a stable agriculture. Apparently, institutions provided by the GOB to encourage this kind of technical change have failed for an average of approximately 50% of the colonos according to statistics cited above. These people tend to move off the project to nearby spontaneous settlements and continue to slah and burn cycle. In contrast, the third level of technology is demonstrated in those foreign colonies which have been successful in providing mechanisms and institutions that encouraged rapid technical change and permitted the transition to a more stable agriculture before the four to five year slash and burn cycle had been completed. In the Mennonite colonies, this took the form of utilizing draft animals to clear and work larger land areas. In the Japanese colonies outside local peon labor was used to clear land. The result is that relatively more land is under cultivation per family in the foreign colonies than in the GOB colonies. The Japanese also developed a strong experiment station which helped to increase the productivity of the land. Thus, foreign colonists changed the level of technology very rapidly by maximizing the scarce resources (labor) through the use of labor saving technical change. As a result, these colonies developed a stable (albeit small farm) agriculture by adopting new techniques and were not forced to continue to resort to slash and burn agriculture.

5. The development of cooperative action - The foreign groups have been able to develop a high degree of local community cooperation which has been very important in their success. This has permitted the Japanese group to maintain an all weather access road into their colony, to market and purchase cooperatively, to maintain an experiment station, and to use production credit, etc. Similar comments apply to the Mennonites and Okinawans. This capacity seems closely related to the presence of traditional social cultural institutions. The spontaneous colonizers have been also shown some proclivity for cooperation, although not in any degree to the extent of that shown in the foreign groups. Such cooperation is most likely related to maintenance of the main access road, and some public services such as health, schools and water supplies. Cooperation has been almost non-existent in the GOB directed projects. With most of the services provided, there has been little

incentive or need for cooperation, and most attempts at GOB sponsored cooperative organization failed.

6. The presence of a potable water supply - This is an essential element in the stability of communities in new-lands areas. It is provided early in most GOB and foreign colonies. However, where it was inadequately developed the effect has been disastrous.

3. GOB Land Use Policy

Over the years the GOB has adopted a basic land use policy which is codified in several decrees and legislative law. Of greatest relevance in this regard are Decree Laws 03464 of August 1953, 07442 and 07443 of December 22, 1965 and 07765 of July 31, 1966, as well as the Legislative Law of October 26, 1905. These laws deliniate a very specific policy regarding unexploited land. The essence of this policy is that the GOB may reserve unexploited land for the distribution to Bolivian farmers, foreign migrants and or for other public works. These unexploited lands include:

a. Uncultivated governmental lands and those in the hands of public or private entities which are not being used for the purpose for which they were awarded;

b. Lands which reverted to the dominion of the State as a result of the Agrarian Reform Law;

c. A zone 10 kms. wide on both sides of highways and railways constructed to enhance territorial integration.

d. Lands on both sides of navigable rivers excluding those legally held by private persons; and

e. Lands which were once unfit for settlement but which have been improved through drainage and removal of basic health hazzards and which if exploited, would contribute socio-economic benefits to Bolivia.

The National Institute of Colonization is responsible for the investigation, planning, execution and evaluation of colonization plans which plans will be in harmony with the National Plan of Economic and Social Development.

In practice, after a potential colonization project has been identified, the INC drafts a Decree Law which (1) reserves a specific tract of land for the colonization project studied, and (2) transfers

sole jurisdiction over the tract to INC from SNRA. If the GOB concurs with the project, a Decree Law is issued reserving the land for colonization and placing the tract under the jurisdiction of INC.

The GOB has defined the objectives of colonization as follows:

a. to promote the internal migration of the rural population, which is heavily concentrated on the Altiplano, in order to achieve (a) social, economic and territorial integration, (b) a reasonable distribution of Bolivia's population, and (c) national unity;

b. to improve the standard of living of the population by (a) promoting migration from the densely populated areas to areas of greater economical potential, (b) restructuring the minifundia system, and (c) incorporating the under employed and unemployed into the agricultural system;

c. to increase the national income, decrease imports and diversify exports and stimulate the establishment of agro-industrial activities;

d. to populate the frontier areas which are sparcely inhabited;

e. to protect the marginal ethnic groups existing in the colonization zones; and

f. to adopt measures which conserve and allow for the effective use of Bolivia's natural resources.

The GOB's land use policy is without a specific strategy for the future incorporation into the productive economy of approximately 70,000,000 hectares of undeveloped land in the oriente. One of the objectives of this loan project is to assist the GOB in the development of a strategy so that the large expenses of unexploited lands can be logically and systematically integrated into the agricultural sector.

4. Genesis of Project

Between 1972 and 1973, two studies were carried out which gave impetus to the idea of providing new support to the growing migration from the highlands to the oriente. Wessel's study demonstrated that small farms in the Bolivian lowlands exhibited greater profitability

than their highland counterparts.[1] The study done by Royden and Wennergren documented 1) the extensiveness and rapidity with which spontaneous settlement occured along the access road constructed by Gulf Oil in the area north of Santa Cruz and 2) the financial success achieved by such settlers when located near an all year, farm-to-market road.[2]

These studies initiated the Mission's interest in new lands development as a method for increasing Bolivian agricultural production and improving the standard of living of rural campesinos and were the basis of a proposal for supporting such a project which was made at the Bolivian Program Review held in Cochabamba March 12-15, 1973. As Bolivia's Agricultural Sector Assessment began to take form, it further developed that the GOB recommendations would place a high priority on the integration of new lands into the agricultural economy with a high degree of campesino participation. During this period the Mission began preliminary discussions with the INC, the MACAG, and related GOB entities relative to USAID support for such development. The resulting Intensive Review Request was submitted to AID/W in November 1973, reviewed by the DAEC on December 5, 1973 and the Mission authorized to proceed with development of the CAP on January 5, 1974.

5. Review and Recommendations of Country Team

The Intensive Review Request for this Loan Project was approved by AID/W in December 1973. The USAID/Bolivia's intensive review of the project took place between December and May 1974 with TDY assistance from AID/W.

The Country Team supports this loan to finance a project of significant impact in support of GOB and U.S. objectives. By providing settlement opportunities in an area potentially rich in agricultural production, the project will help Bolivia toward realizing its production and development potential, in strengthening the national economy, and in raising the incomes and living standards of its rural population. By providing opportunities for human betterment in a potentially rich

---

1/ Kelso L. Wessel, "The Profitability of Small Farms in Bolivia" Cornell International Agricultural Development Dept. Mimeographed 37 (April 1972)

2/ Thomas C. Royden and E. Boyd Wennergre, "The Impact of Access Roads on Sponteneous Colonization", USU Series 23/73 (1973) pp. 85

agricultural area in the Bolivian Oriente, the project will help to reduce the pressure on the already overpopulated lands of the Bolivian Altiplano and high mountain valleys and thereby promote a more stable political ambiente in these regions.

We conclude that the project is feasible and sound and that it effectively furthers the overall strategy adopted by the Country Team in terms of development, political, and social objectives.

SECTION II - PROJECT ANALYSIS

A. Executing Agency and Other Participating Entities

1. Executing Agency

While the Bolivian Government will be the borrower of record, the Instituto Nacional de Colonización (INC) will be the executing agency for this loan with the responsibility for its execution. The following is a brief discussion of INC's history; organization; previous experience with external financing; managerial, financial and technical capabilities; and role in the project.

a. Origin and Legislative History

Prior to 1965 several public and quasi-public entities were concerned with the colonization process. In order to centralize and rationalize this process, the GOB created through Decree N° 07226 of June 28, 1965 the Instituto Nacional de Colonización y Desarrollo de Comunidades Rurales from the various public entities hitherto involved in colonization. This law was followed by Decree N° 07443 of December 22, 1965 through which the GOB established the Institute's organizational framework, designated it as a semi-autonomous entity, and charged it with the responsibility for investigating, planning, executing and evaluating colonization and rural community development plans. Finally, on July 12, 1967 by Decree N° 08047, the INC was separated from the Rural Community Development Division, both entities remaining under the Ministry of Campesino Affairs and Agriculture. In 1972 INC was transferred to the newly created Ministry of Campesino Affairs which had been split from the agricultural sub-division of the old Ministry. Under the recent cabinet reorganization of February 14, 1974, INC was again brought under the consolidated Ministry of Campesino Affairs, Agriculture and Livestock (MACAG).

b. Organization

The Instituto Nacional de Colonización (INC) at present has a staff of approximately 306 employees "on board" which is spread among the central office in La Paz, three regional and several sub-regional offices (see Annex II, Exhibit 1). The regionally decentralized nature of the organization is intended to provide technical personnel at the "grass-roots" level to assist the various colonies scattered within the three principal settlement regions of the country.

1) The Central Level

INC's central office in La Paz employs approximately 97 people and consists of the Director, an Administrative Department and various other technical departments which support the colonization program being executed by the institute.

The Director is primarily responsible for the administration of the Institute and the execution of the GOB's colonization policy. In addition he serves on the inter-ministerial Operations Committee, which is composed of various agency representatives who have responsibilites in colonization and rural community development. Finally he presides over the Institute's Executive Council for Coordination which is composed of the various department chiefs.

Besides a traditionally organized Administrative Dapartment composed of the divisions of Budgeting and Accounting, Personnel, Food Assistance, Transportation and Procurement and Supply, the Director is supported by various technical departments whose responsibilities cover a wide range of inputs necessary to carry out a colonization program. The principal technical departments include:

(i) the Planning Department which is responsible for the preparation of all aspects of colonization plans and projects as well as the evaluation of colonization activities;

(ii) the Land Titling and Registry Department which is in charge of the legal aspects of reserving unexploited public lands for the purpose of colonization and, once the GOB has set aside such land, handles the registry and titling of the reserve;

(iii) the Infrastructure Department which has the responsibility for surveying the unexploited lands required for colonization purposes, the rendering of topographic maps of the regions surveyed and the maintenance of all maps necessary to control the lands under the jurisdiction of INC;

(iv) the Department of Health and Social Promotion which is composed of the Division of Social Promotion with the responsibility for programming and executing the various social work plans, including education and home improvement, and organizing the settlement of people in new colonization areas; and, the Division of Health with the responsibility for administering the health activities in the colonization areas, administering medical examinations to the settlers and controlling epidemic diseases in the colonization zone; and

(v) the Department of Production which is responsible through its Division of Exploitation, for the management of various agro-industrial activities, including the cacao plant and buffalo projects, and through its Division of Heavy Equipment, for the planning, assiting and/or supervising of transportation programs and services and the controlling of road equipment.

2) The Regional Level

INC's three regional offices located in Santa Ana (Alto Beni) Ivivigarzama (Cochabamba) and Montero (Santa Cruz) have a total staff of approximately 71. The largest of these regional offices is located in Montero, north of the city of Santa Cruz, and contains a staff of approximately 37. This office will provide support to the loan project which will be located within its jurisdiction. Its principal responsibilities are to (1) provide administrative support to the zonal offices associated with it, (2) supervise the execution of the projects within the zones under its administration, (3) handle the legal problems associated with land distribution in the settlement zones under its influence, and (4) support and supervise the construction of roads and wells in the settlement zones.

INC's Montero office, which is typical of the other two regional offices, is organized to carry out the responsibilities enumerated above. The Regional Chief is primarily responsible for the administration of his office and the supervision of the zonal offices within his region. In addition, it is his responsibility to see that technical support is made available from the Montero Office to the zonal offices when required.

The Administrative and Accounting office is primarily responsible for the accounting function for the office. In addition it mantains the files on all zonal project activities. The office also maintains warehouse facilities, handles radio operations and provides the services of chauffeurs and night watchman.

The Office of the Legal Counsel is responsible for assisting the settlers in the settlement zones under the offices jurisdiction in the preparation of the legal documents required for receiving their titles. In addition, it provides the regional chief with advice on all legal matters.

Lastly, the Office of Production and Heavy Equipment has the responsibility for either supervising, or constructing roads and potable water wells in the settlement zones under the office's jurisdiction.

3) The Zonal Level

The sixteen zonal offices have a total staff of 138 and are associated with one of the regional offices. The most important of these from the standpoint of the loan project are two of the four zonal offices under the Montero regional office including those located at San Julian and San Pedro. The offices located at San Julian and San Pedro have 22 and 13 personnel respectively while the others have a total staff of 18.

Unlike the three smaller zonal offices, the San Julian Office is staffed and responsible for the execution of the small, existing San Julian project. The Zonal Chief is primarily responsible for the administration of the ongoing project in his zone. He is supported by an Administrative and Accounting Office organized much like the one that exists at the regional level. In addition he is served by the offices of Topography (Survey), Health, Production and Heavy Equipment, and Agriculture. These offices are responsible for carrying out the various components of the ongoing San Julian project which include the surveying of the project site and the laying out of plots and blocks for settlement, the provision of health facilities, the construction of roads and the provision of agriculture extension.

c. Experience in External Financing

The INC has had prior experience with the administration and implementation of external financing from both the Inter-American Development Bank (IDB) and A.I.D. In 1963, the Corporación Boliviana de Fomento (CBF), a predecessor agency of INC, negotiated loan N° 51-TF/BO with the IDB for $6.5 million. These funds were assigned to the settlement projects in the Alto Beni, Chimoré and Yapacaní areas. Shortly after the initiation of the disbursement of the IDB loan, INC became the executing agency as a result of the consolidation of the various public agencies working in colonization. Thus, INC subsumed CBF's staff and responsibilities as well as the functions and personnel of various other agencies working in the field.

In addition to these funds, A.I.D. provided grant assistance totaling $300,000 to the INC between 1966 and 1970. This assistance was given through Grant Agreements and was intended to support the IDB loan activities in the Alto Beni, Chimoré and Yapacaní project areas. Essentially, A.I.D.'s contribution was used to cover a part of the cost of operating various community centers located in the three INC/IDB project zones.

d. Managerial, Financial and Technical Capability

In order to determine if the INC was adequately organized and staffed to handle the administration of the proposed loan project, the Mission Controller performed a study of its managerial and financial capabilities. After analyzing the organization of INC, the bio-data and experience of its managerial personnel, and the financial divisions, its reports and records, the Controller concluded that, regarding the "moderately active" role in the project outlined in 'e" below, "we believe that the management of INC is well qualified and capable of managing the proposed A.I.D. colonization loan .....".

However, although finding the overall managerial qualifications of the INC staff acceptable, three exceptions were noted to that conclusion:

(i) the Director and Deputy Director, who are both from the Military, apparently have no technical capability which would lend itself to managing a complicated colonization program. Thus, it is recommended that a permanent, non-political, technical expert be brought into INC's top management;

(ii) the Chief of the Planning Department was found to have limited educational preparation and technical proficiency for handling his critical planning and evaluation task. We expect that the Ministry's staffing plan will provide for considerable strengthening of this office;

(iii) the Chief Auditor was found to have no previous financial or auditing training or experience and the audit department was not performing the traditional audit functions. Therefore, it is expected that the staffing and implementation plans will include a complete overhaul of this office.

During the process of analyzing the management capability of the various departments, the Controller's staff also observed that the INC organizational chart was not prepared strictly on the basis of the existence of departments and their sub-divisions but also included functional tasks. Thus, in order rationally to depict the structure and organization of INC and to reduce the duplication of functions found in the existing organizational chart, it is recommended that it be redesigned to reflect actual INC departments and their divisions rather than functions (see Annex II, Exhibit 2).

With respect to the technical capability of INC's Central Office and its Montero regional and associated zonal offices, a study

was performed by the Mission Engineering and Transportation Division. Visits were made to both offices to determine the qualifications of each to carry out technical construction projects.

At the regional office it was found that a heavy equipment and construction staff of 12 was in existence and that it had prior experience in:

1. well drilling and that, with adequate equipment, it was capable of handling this activity;

2. building construction but that its capability was insufficient to build complicated agricultural service centers (A.S.C.);

3. the construction of dry-weather-access-trails but, in order to handle the 800 kms. of "trails" planned, additional road construction equipment and personnel to operate it would be necessary.

In addition, it was found that the INC regional office has a small maintenance facility and that its staff of 3 has had prior experience in equipment upkeep. However, additional facilities and tools would be required to handle a larger equipment pool.

The INC's role in the titling process is to handle the surveying of settler plots and provide this information to the INC's regional legal office which prepares the "expediente". This document is sent to the National Agrarian Reform Service (SNRA) and contains the information necessary for the SNRA to grant title to the settler. The INC survey staff of 4 was found to have had extensive prior experience, were qualified and equipped to handle the surveying needs of the project. When required, the survey staff can be increased by SNRA staff surveyors under a existing agreement between the two services.

At the central level, the Engineering Division was found to have two civil engineers, a mechanical engineer, one architect and several draftsmen. This staff was deemed adequate, in terms of training, experience and size, to support a field program including, the drilling of wells, the construction of dry-weather-access-trails and the building of simple health posts.

Thus, the ETD study concluded that the INC regional office at Montero, supported by the central office engineering and heavy equipment staff, was capable of carrying out the survey activities in the San Julian project area, the drilling of the necessary potable water wells, and the construction of simple health posts and dry-weather-access-trails. However, it was recommended that a well drilling rig

and additional road construction equipment be purchased, additional heavy equipment operators be hired, and facilities and tools be provided in order to adequately maintain all new equipment.

Regarding the managerial capability of the regional office, the chief of that office apparently has little experience in administering a large regional office and/or the various zonal offices under its jurisdiction. He appears to have little understanding of the office's activities, often deferring to his subordinates for answers to routine questions on office procedures and operations.

The personnel and technical capabilities studies performed indicate that the regional office staff itself is basically qualified. However, since management appears to be a basic problem of the office, it is recommended that the regional chief be isolated from the direct management of this project and that a local project chief, acceptable to A.I.D., be appointed. The Minister of Campesino Affairs, Agriculture and Livestock has already indicated his readiness to make such a staff change.

e. Role in Project

A functional analysis of the Sub-Tropical Lands Development Loan Project indicates that the project is composed of approximately twenty discrete activities. A listing of these activities includes:

1. Community Promotion;

2. Design of Penetration Roads;

3. Contracting of Penetration Road Construction;

4. Construction of Penetration Roads;

5. Supervision of Construction and Maintenance of Penetration Roads;

6. Construction of "Trails" in the Chane/Piray sub-area;

7. Construction of "Trails" in the San Julian sub-area;

8. Parcellization and Allocation of the San Julian sub-area;

9. Provision of potable water in the San Julian sub-area;

10. Construction of a Sanitary Post in the San Julián sub-area;

11. Construction of two Agricultural Service Centers;

12. Management of two Agricultural Service Centers;

13. Orientation of Settlers in the San Julian sub-area;

14. Provision of Extension/Research services;

15. Administration of the Cooperative Development program;

16. Administration of the Credit program;

17. Administration of the Provisional Titling Process;

18. Administration of actual Titling;

19. Execution of the Land Resource Study; and

20. Coordination of the Loan Project Activities of the other participating entities.

With respect to the above list of activities, three alternative levels of INC involvement in the loan project were considered by the Mission:

1. active participation - assumes that INC would be involved in a wide range of activities, some of which are beyond its traditional sphere of operations;

2. moderately active participation - places INC in a position to carry out those tasks which it has previously undertaken in prior projects; and

3. simple participation - would greatly restrict INC's involvement.

These levels of INC involvement, as well as the activities of the other participating entities at each level of INC participation, are illustrated in Table 2 with activity numbers keyed to the above list.

TABLE

INC and Other Participating Entity Levels of Involvment in the Subtropical Lands Development Loan

Levels of INC Part'n	INC	Ext/Res MACAG	SNDC	UCG	SNC	BAB	SNRA	DESEC	GEOBOL	Private Sector
1. Active	(1)3,6 7,8,9,10 11,12,(14) 17,(19),20	14 (16)	1,(13) 15,(16)	13 (15)	5	16	18	1	19	2.4
2. Moderately Active	(1),7,8 9,10,(11) 17,(19) 20	12,14 (16) (20)	1,6,(13) 15,(16)	13 15	2,3 5	16	18	1	19	4,11
3. Simple Participation	(1),7,8 9,10	12,14 (16),20	1,6,(13) 15,16	13 (15)	2,3 5	16	17,18	1	19	4,11

Note: ( ) indicates the entity has secondary or limited responsibility for that activity and that another institution will be primarily responsible for its execution.

After considering the requirement that INC be able to replicate the model developed, the INC's fields of competency and interest, its prior experience, and the need to eliminate those activities which would require a long term INC presence, it was decided that INC's level of participation in the Loan project should be at the level described above as "moderately active". This level of participation includes:

1. Secondary responsibility in community promotion;

7. Construction of "trails" in the San Julian sub-area;

8. Parcellization and allocation of the San Julian sub-area;

9. Provision of potable water in the San Julian sub-area;

10. Construction of a sanitary post in the San Julian sub-area;

11. Secondary responsibility for the construction of two agricultural service centers;

17. Administration of the provisional titling process;

19. Secondary responsibility in execution of the land resource study; and

20. Coordination of the loan project activities of the other participating entities.

2. Principal Participating Entities

Besides the executing agency, four other public and private entities will play a significant role in the execution of the loan project. These entities include the MACAG Extension and Research Departments, the National Community Development Service (NCDS) and the United Churches Group (UCG).

a. Agricultural Extension and Research

The Agricultural Extension Service (AgEx) of the MACAG is responsible for the introduction of modern inputs, seeds and techniques of production; the development of youth and home economics programs; and the provision of agricultural information through various communication media. To carry out these activities, the AgEx is organized into a small central office in La Paz and a network of 9 regional and approximately 70 provincial offices spread throughout the country. Of the total AgEx staff of 91, the regional network contains 89 who are, for the most part, agronomists and college graduates with backgrounds in related fields. The regional and provincial offices in Santa Cruz contain eight extension agents, three of which are in the general project locale: Mineros, Warnes and Montero. Since the early 1960's, the extension program has suffered from a lack of funding which has resulted in the loss of staff and expertise and a limited schedule of field trips by agents thereby reducing the number of farmers reached through the program.

The Agricultural Research Service (AgRe) of the MACAG is responsible for the investigation of problems relevant to the agriculture. This activity is carried out in nine agricultural research stations located in the principal geographical/ecological zones of the country. The Saavedra Research Station, located in close proximity to the project area, will provide agricultural research "backstopping" to the agricultural service centers (ASC) in the San Julian and Chane/Piray areas. The Saavedra station is composed of approximately 29 full time employees including an agricultural engineer, three agronomists and six university students specializing in various agricultural fields as well as an expert on oil seeds and fibers who is funded by Nationalist China. The research station is presently carrying out programs in sugar cane, oil seeds (including soya and peanuts), upland rice and animal forage while its affiliated sub-station

in Portachuelo is focusing on wheat. While these facilities are relatively well equipped, they have suffered, like the AgEx, from budgetary problems resulting in staff turnover.

The principal role of these two services in the loan project is to provide extension services and research data for the project area. The mobility of personnel has been a chronic problem since the early 1960's and has impaired the ability of both services to get into "the field" with their information. In addition, lack of funds has limited the quality and quantity of their respective services. To improve one of these situations, an A.I.D. loan (the FRA) provided 101 vehicles to the MACAG for the AgEx and AgRe activities. Of the 47 vehicles which arrived in early May, nine were distributed to the Santa Cruz Department, five of which will support activities in the immediate project area. In addition, the AgEx budget was increased from approximately $180,000 in 1973 to approximately $275,000 in 1974 for an increase of 52%.

Thus, based on the increased commitment of the GOB to the AgEx in the form of budgetary support for increased staff in the area and the arrival and availability of new equipment to the AgEx and AgRe Services, the Project Committee believes that these entities will be able to adequately carry out their respective responsibilities under the loan project.

b. UCG

The role of the United Churches Group in the loan project is a limited but an important one. It includes the responsibility for the orientation program in the San Julian sub-area and secondary responsibility in the cooperative development program.

The UCG is a confederation of three churches in the Santa Cruz area: the Catholic, Methodist and Mennonite Central Committee. It was organized in 1970 to coordinate the activities of the churches with an interest in colonization in the Department of Santa Cruz. However, in 1971 the UCG decided to undertake projects involving the orientation of colonists arriving in the area. Experience for this activity was provided by a 1968 orientation project carried out by the Methodist and Catholic Churches in the Hardeman settlement area.

The initial UCG orientation program was carried out in the Piray Colony with a $30,000 grant from Oxfam. Their activities included an orientation program reaching 120 families and a modest supervised credit and road improvement project benefiting many others. In 1972, UCG extended its efforts to the San Julian area with a $20,000 grant from the World Council of Churches. Its program is

closely coordinated with the INC which has a small, ongoing project in the area. By the end of 1973, 100 families were settled through the UCG orientation process. However, in 1974 an estimated 280 families are expected to participate. In recent months, the UCG has provided assistance to the victims of the sever flooding in the Santa Cruz area. Using a Dominican Fathers grant amounting to $5,000, the UCG program provides food relief, seeds, agricultural assistance and nutritional instructions to flood victims.

In carrying out its activities, the UCG has acquired a staff which can be divided into three groups. The full time staff of 11 (6 Catholics, 3 Methodists and 2 Mennonites) has its salary paid by the respective participating churches. This group is educated and includes recipients of Master Degrees from U. S. institutions in rural sociology, agricultural economics and agronomy as well as people with backgrounds in community development and public health. A volunteer group assists in the orientation program. These volunteers come from the participating churches and stay an average 27 months. The Mennonites, for example, have had from 4-6 volunteers with backgrounds in agriculture and public health serving in the area. Finally, a Bolivian staff of ex-colonists is contracted on a short term basis. They generally serve as "orientadores" providing instruction to new colonists in such things as home construction, land clearing practices, and use of basic tools, etc. UCG has a large pool of these people who have been trained and can be contracted for periods up to three months a year.

As indicated above, the UCG has had prior experience in the field of settler orientation, it possesses a trained and sufficiently large pool of "orientadores" necessary to expand its program, and its staff is trained and motivated to carry out the orientation activity. In addition, minimal loan funds will be used to purchase some equipment and possibly pay some salary costs of "orientadores" needed to expand the program. Therefore, although the loan project will require UCG to orient more families per year than at present, the Project Committee believes that UCG has the requisite capability to carry out its prescribed role.

c. NCDS

As illustrated in Table 2, the role of the NCDS in the loan project includes the promotion of settlement among community groups; construction of "trails" and other self-help, community development activities in the Chane/Piray sub-area; participation in the

settler orientation program in the San Julian sub-area; execution of the cooperative development program; and a secondary role in the credit program.

The NCDS has been directly involved in rural community development through its 8 regional offices, one located in Santa Cruz. Since its advent in 1965, NCDS has constructed some 1,406 self help projects including 632 schools, 395 engineering projects, 194 health facilities and 185 agricultural projects. Through its regional training centers, one located near the project area in Montero, the NCDS has been involved in the training of over 15,000 community leaders. Finally, within the past year the cooperative development division of the MACAG was transferred to the NCDS where it is now preparing plans and activities for a program in rural cooperative development.

The NCDS has had extensive prior experience with external financing. In the mid-1960's it administered $435,000 loan from the Inter-American Development Bank. In addition, the NCDS has disbursed a $915,000 A.I.D. loan signed in 1970 and is currently administering a $3.0 million A.I.D. loan signed on September 15, 1972. Finally, considerable amounts of grant technical assistance was provided by A.I.D. from 1965 to the present.

Therefore, based on the role that the NCDS is expected to play in the loan project, the NCDS's prior experience with rural self-help, community development activities and external financing, and its proven managerial and technical capability, the USAID Project Committee believes that the NCDS is capable of executing its responsibilities under the loan project.

3. Other Participating Entities

Besides the four participating entities discussed above, five other entities will play a less significant part in the loan project. These entities include the National Road Service (SNC), Bolivian Agricultural Bank (BAB), National Agrarian Reform Service (SNRA), Center for Social and Economic Development (DESEC) and Bolivian Geological Survey (Geobol).

a. SNC

As illustrated by Table 2 above, the role of the National Road Service in the loan project includes the design, contracting and supervision of road construction services as well as the maintenance of the roads once they are completed.

The SNC is the GOB's public road construction and maintenance organization and, as such, is responsible for the contracting and supervision of road construction, the construction of roads under certain circumstances, and the maintenance of all completed primary, secondary and feeder roads in Bolivia. Since 1960, A.I.D. has channeled approximately $90.0 million through SNC for the construction of various roads. The most notable of these projects include the La Paz-Oruro Road; Roads 1 and 4, which connect Cochabamba with the Chapare Region; and Roads 3 and 7, which connect Montero and the rich agricultural land surrounding that city with Santa Cruz. With A.I.D. funds, SNC has contracted for and supervised the construction of approximately 2,074 kilometers of road, constructed under force account approximately another 434 kilometers and as of 1972 maintained a total of approximately 28,246 kilometers of primary, secondary and feeder roads.

Based on SNC's prior experience and the role it will play in the loan project, the Project Committee believes that SNC is capable of successfully carrying out its responsibilities as described above.

b. BAB

The Bolivian Agricultural Bank is an autonomous, public banking institution which is chartered to provide agricultural credit to the Bolivian farming community. The Central Office, located in La Paz, is supported by eight regional and approximately 36 associated provincial offices scattered throughout the various agricultural regions of the country. The BAB has administered approximately $7.5 million of A.I.D. financing as well as several IDB loans amounting to approximately $20.0 million.

As illustrated by Table 2 above, the role of the BAB in the loan project is a limited one. Its role essentially involves the physical administration of the $500,000 credit fund to be established for the use of small farmers in the project area. In addition, together with an agricultural extension agent, cooperative development specialist and local campesino leaders, the local BAB agent will have the responsibility for the credit decision on the small farmer's credit application.

It is recognized that the BAB has had a poor "track record" in administering previous agricultural credit programs. Nevertheless, the Project Committee believes that, given (i) the improvement of BAB's administrative and financial position, 1/

1/ International Development Association, Report and Recommendation of The President of the Executive Directors on A Proposed Credit to The Republic of Bolivia for a Third ENDE Power Project, Aug. 29, 1973.

(ii) the provision of agricultural extension to the small farmers of the region thereby minimizing the credit risk, (iii) the provision of assistance to the campesino in the preparation of his farm budget and loan application, and (iv) the inclusion of an agricultural, cooperative, extension, and credit specialist in the loan approval process, the BAB will be able to fulfill its role adequately.

c. SNRA

As illustrated in Table 2, the National Agrarian Reform Service has a single role to play in the loan project: to administer the final titling phase of the land titling process. The INC will be responsible for the more technical aspects of the initial titling phase (see II, A,1).

The SNRA has been charged with broad authority to carry out the Land Reform Law of 1953 including the initiation of agrarian reform cases, the judgement of their merits, the redistribution of land and the granting and distribution of new titles. To carry out these functions, SNRA is organized into a central, judicial office located in La Paz, known as the National Agrarian Reform Council (CNRA), which is supported by branch offices located in the capital cities of each of the eight departments. There are about 20 Mobile Brigades working out of the central CNRA office which contain an agrarian reform lawyer/judge, a secretary and about six topographers. These Brigades work throughout the country and provide the central office with data to prepare titles. From 1955 through 1968 SNRA distributed 309,529 individual and group titles using ordinary methods. During the first five years (1968-1972) of the Mobile Brigade program about 250,000 titles were distributed by SNRA. These activites received A.I.D. assistance in the late 1960's amounting to a $300,000 local currency loan, a $92,600 grant and a grant agreement of approximately $360,000. These funds were used to purchase related equipment and support the "mobile titling units" program and the title processing operation.

Historically, SNRA has been involved in all phases of the land reform process: the adjudication of old land holdings, the rea location of lands, the survey of lots distributed under agrarian reform legislation, the preparation of the "expediente" which requests the granting of final title, the review of that request, and finally the granting and distribution of all new land titles. However, in the colonization zones, INC is responsible for most of those activities traditionally carried out by SNRA up to and including the

preparation of the "expediente". Hence, in the project area, SNRA's role will be limited to carrying out the final phase in the titling process, i.e., reviewing the "expediente" and granting and distributing land titles. Therefore, given SNRA's prior experience in the area of land titling and the limited nature of its role in the titling process in the project area, the Project Committee believes that SNRA is capable of executing its role.

d. DESEC

The Center for Economic and Social Development will be responsible, along with the NCDS and INC, for the promotional ("educational") activities included in the loan project. These activities will be carried out in rural communities of the Altiplano, and in the high mountain valley of Cochabamba with the objective of "realistic" promotion of small farmer migration and settlement in the project area.

The DESEC is a private, non profit organization with offices in Cochabamba, La Paz, Oruro, Santa Cruz and Montero. It was founded in 1963 to promote popular participation in the social and economic development of Bolivia. To accomplish this objective, DESEC has organized several autonomous entities which are engaged in rural development, handicrafts and rural services, health services, rural housing, and campesino education. The Instituto Campesino de Educación (I.C.E.), one of these autonomous entities, has been involved with campesino education in the five DESEC offices by presenting lectures and distributing a monthly educational newspaper. This entity will provide the mechanism for DESEC's promotional activities.

In support of its activities, DESEC has acquired a staff of approximately 60 and has received substantial funding from European and Canadian sources. In the past year, the organization has received a $123,000 grant from the Inter-American Foundation for a rural development project. In addition, the DESEC National Director in Cochabamba was contracted by the IDB to work in the area of rural community development in Haití. Both its financial support and consulting expertise attest to DESEC's sound reputation and capability in the field of rural community development. DESEC's contribution will be on a voluntary, non-reimbursable basis.

Thus, based on its prior experience in the field of rural community development and campesino education and given its role in the loan project, it is the opinion of the Project Committee that DESEC is qualified to carry out its responsibility under the loan.

e. Geobol

The role of Geobol in the loan project is to carry out a basic land resource study of the Bolivian Oriente in order to determine the suitability of these lands for future settlement projects. ERTS and Skylab materials would be the basis of the initial study which would be followed by a "ground truth survey" to confirm the validity of the study's funding. The Earth Resources Technology Satellite (ERTS) Project Office of Geobol would carry out the study. It has been working with and interpreting both ERTS and Skylab imagery for some time. The Director of the office has a doctorate in geology and has a small professional staff under his direction.

In order to determine if the ERTS Project Office had the capability to carry out its role, an assessment of the office was carried out by AID's Office of Science and Technology. Its final report indicates that the ERTS Project Office "has been significantly successful, through the efforts of a small cadre of professionals under Dr. Brockmann's leadership", in the utilization of ERTS materials.1/ However, the report also indicates that if the ERTS Office is successfully to expand its activities to include the above mentioned land resource study, some materials and equipment, additional training for the professional staff and the services of a technical advisor in computer processing of ERTS materials are required.

Based on these fundings and the provision of those items mentioned above to Geobol from loan funds, the Project Committee believes that the ERTS Project Office will be able to carry out its role under the loan project.

4. Coordinating Mechanism

As suggested by the preceeding discussion of the various participating entities, the sub-tropical lands development project is a complicated one requiring inputs from eight GOB entities (INC, the Extension and Research Services of MACAG, SNDC, SNC, BAB, SNRA, and Geobol) and two private organizations (UCG and DESEC). In order to achieve cooperation among these governmental and private organizations, inter-ministerial agreements or contracts will be signed between the MACAG/INC and the other non-MACAG participants. These documents will

---

1/ John C. Fry, Natural Resource Assessment by Remote Sensing For Sub-Tropical Land Development in Bolivia, April 2, 1974.

specify, among other items, each party's responsibilities, the financing to be provided by each party and a schedule of work to be performed by the entity. This arrangement has been successfully employed by the GOB in the past to achieve mutual understanding and cooperation.

In addition, if the project is to be successfully carried out, a coordinating mechanism suited to the nature of the project is essential. It must provide a method for dealing with public entities which, at times, hold dissimilar views and focus the coordinating responsibility on one individual or small office with expertise in project coordination, evaluation, and the settlement process. The Project Committee believes that such a mechanism can be constructed by reorganizing the existing Operations Committee of INC and including a Project Coordinator in the mechanism (see Chart 1).

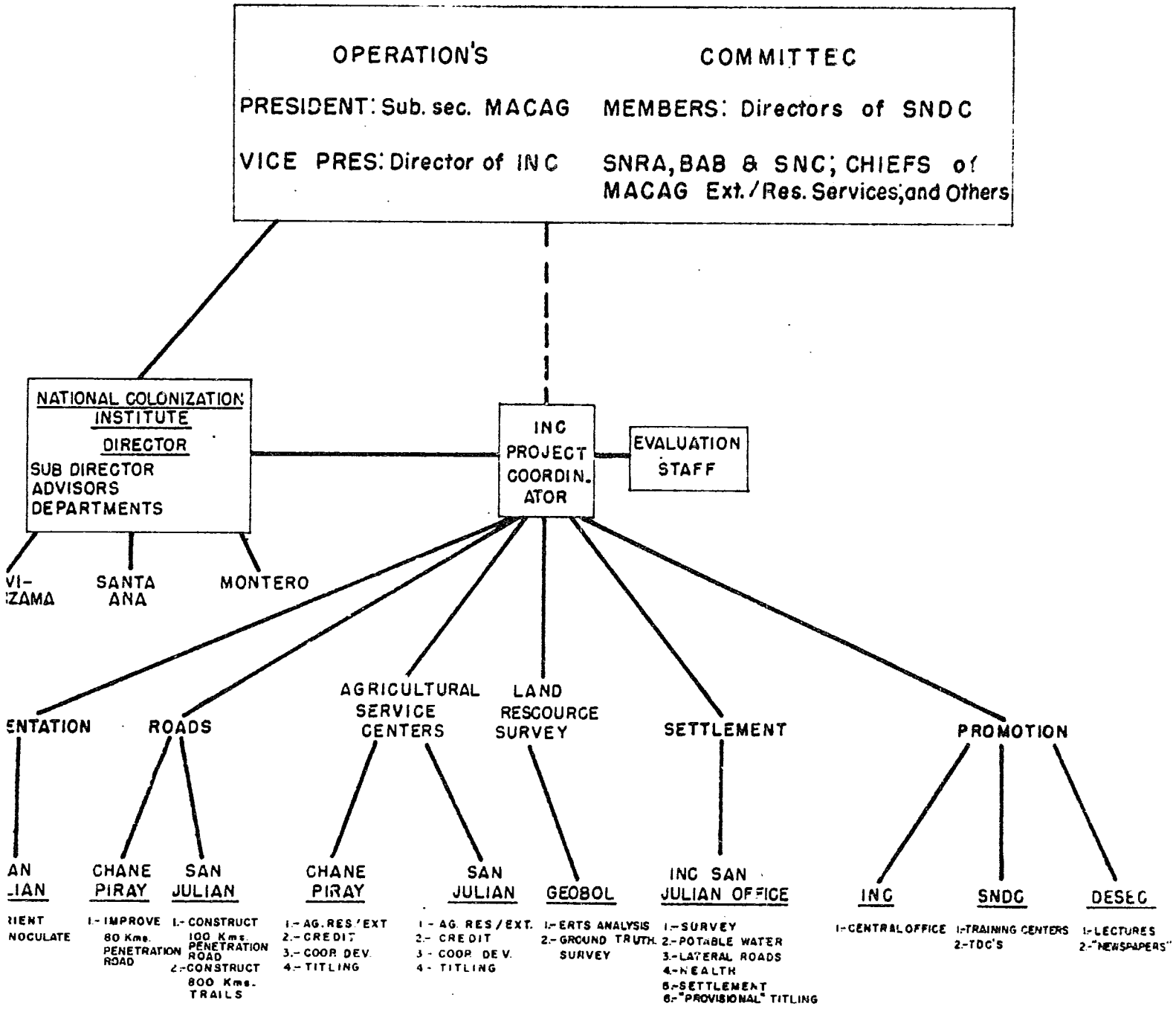
Decree N° 07443 of December 22, 1965 which established the structure and responsibilities of INC also established three coordinating organizations, including the Operations Committee (Junta de Operaciones). According to the decree, the committee shall be chaired by the Director of INC and, in addition, shall be composed of representatives from public entities which have responsibility for colonization and community development. The representatives include the General Directors of the Ministries of Agriculture, Education and Health, the General Director of SNC, the General Manager of BAB, a member of the Military Engineering Command, the Chiefs of the Departments of INC and NCDS, and the Legal Advisor of INC who acts as the committee's secretary. If the Operations Committee is reorganized, the Project Committee believes that it can be a principal component of the project coordination mechanism. This reorganization would include two significant changes:

1. the Sub-Secretary for agriculture of the MACAG would become the chairman of the Committee and the Director of INC would become the sub-chairman; and

2. the Committee would be reconstituted to include, in addition to the General Directors of the Ministries of Education and Health, the General Director of SNC, and the General Manager of BAB, the Directors of SNDC and SNRA, the Chiefs of the Agricultural Extension and Research Services and the Project Coordinator, acting as the committee's executive secretary, or their chosen representatives.

CHART 1

COORDINATING MECANISM



In addition to these changes in the Operations Committee, the coordinating mechanism requires the establishment within INC of a Project Coordinator (P.C.) who will have the immediate responsibility for managing, coordinating and reporting on the various activities associated with the loan project, i.e., promotion, road construction, construction and management of the Agricultural Service Centers (ASC), settlement, and orientation. Furthermore, the P. C. will have project evaluation responsibilities and a small staff to assist him in that task. Thus, the P. C. would be the focal point of coordination activities and, hence, would provide the logical counterpart for the USAID project supervisor.

With these changes in place, the process of coordinating the loan project would function as follows. As the project is executed, the supervisor for road construction, the chief of the ASC, and the INC zonal chief in San Julian, for example, would prepare monthly reports for the Project Coordinator. These reports would cover the various project related activites under each supervisor's/ manager's jurisdiction and indicate progress and bottlenecks being encountered in project execution.

Upon receipt, the monthly reports would be reviewed by the P. C. who would flag problems and take appropriate corrective actions in those cases where he is empowered to do so. Where the situation cannot be handled by the P. C., he would report the problem and its probable solution to the Director of INC who would, in turn, inform the Sub-Secretary of the MACAG. At the regular meeting of the Operations Committee, the Sub-Secretary would direct the appropriate agency Director to take corrective action. The agency Director would then have to see to it that the adjustment is made at the project level or risk a confrontation with the Sub-Secretary and ultimately the Minister of Agriculture.

All project progress reports emanating from the project area would be reviewed and analyzed by the evaluation staff of the P. C. From these reports, the evaluation staff would prepare a periodic project evaluation which would cover all aspects of the settlement program. This report would be reviewed by the P. C. and become the basis for more basic alterations in the program. His findings would be reported to the INC Director and then to the Operations Committee.

Thus, through the process outlined above, many operational bottlenecks encountered in project implementation would be quickly and easily corrected by the P. C. In other cases, where cross agency

interests or disagreements impair correction by the project coordinator, he has recourse, through the INC Director, to the Sub-Secretary of the MACAG who can, due to his rank, order that adjustments be made. Finally, the ongoing evaluation process, carried out by the P. C.'s evaluation staff, will provide the empirical data necessary to make rational decisions about how to adjust the program to better achieve its purpose.

5. Recommendations on Technical Assistance

The technical assistance requirements for the Instituto Nacional de Colonización (INC) during the life of the loan fall into two categories: grant and loan funded.

With regard to the first category, the Mission's existing Rural Development Division will provide "backstopping" to the Mission's project supervisor who will provide basic support to INC in the areas of management, information, laison with USAID/B, and implementation of the loan project. In addition to this assistance, $150,000 of grant funds will be used to contract the project supervisor for a three year period. The project supervisor will serve as the immediate counterpart to the Project Coordinator and INC and work with both on day-to-day problems. Finally, loan funded TA costing $50,000 is required to assist INC in the design of a settlement project evaluation system.

The loan program provides for the establishment of an evaluation staff within the office of the project coordinator (see II, A,4). Loan funds will be provided to obtain advisory services to develop this staff's capability to implement the evaluation system designed and to analyze the data received from it for evaluation purposes. In addition to evaluation, these services will provide assistance in management, especially in the use of evaluation data for project management purposes, and in personnel training. In carrying out these activities, the loan will provide funding of $150,000 which will include, as a minimum, the services of one project management/evaluation advisor and short-term consultants as required. The project management/evaluation advisor will probably be from the United States. The short-term consultants may come from either the United States, Bolivia or another Latin American country.

In addition to the technical assistance to be provided to INC, loan funds will also be used to obtain technical advisory services for the Bolivian Geological Service (Geobol). These services will assist Geobol to utilize new approaches for extracting

information from ERTS materials—particularly oriented to agricultural applications—using computer processing techniques (see II, A,3). To carry out this activity, loan funds will be provided to obtain one man year of technical advisory services costing $50,000.

B. Engineering Analysis.

1. General Description

The engineering portion of the project encompasses the planning, design and construction of approximately 100 km. of all weather penetration road, 800 kms of dry weather access trails and the improvement of approximately 80 km. of dry weather penetration road to all weather status. Also included are the provision of approximately 200 potable water points, which will be supplied by deep wells, the construction of two regional agricultural regional service centers and one small sanitary post.

The new penetration road in the San Julian area will consist of a 8 meter roadbed with approximately 4 meters of crushed rock all weather surfacing. The surface of the road will be an average of 70 cm. above the natural terrain, and include side ditches and culverts. No bridges or major drainage structure are anticipated at this time. Culverts will be locally fabricated concrete pipe or imported corrugated metal pipe.

Improvement of the existing road in the Chané-Independencia area will include compaction, elevating and widening the existing roadway, with the addition of crushed rock surfacing and drainage facilities.

The dry weather access trails will provide secondary access from the penetration roads and will consist of clearing and grubbing, a slightly raised unsurfaced roadbed with side ditches and minimal drainage facilities. These roads will not extend more than 8 kms. (average) from the all weather penetration road.

Two Agricultural Services Centers will be constructed, one in the San Julian area, and the other in the Chané-Independencia area to provide a center for extension and research services, credit, cooperative development, and titling activities as well as for adult education. Local materials; i.e. brick, block or lumber will be the primary materials used.

One new sanitary post will be constructed in the San Julian area. It is a minimal medical facility with a resident nurse and a visiting doctor. Local materials will be used for the construction of this building.

2. Studies

The selection of this particular area was based on many considerations, such as soil types and rainfall necessary to

produce the type of crops in short supply in Bolivia, access to marketing centers, percentage of usable land, drainage requirements for irrigation, transportation infrastructure necessary to reach the site and sites available for colonization. Four sites were considered: the Alto Beni north of La Paz, the Chapare-Yapacani region, the area south of Santa Cruz and the project site. The project site was selected as best meeting the criteria mentioned above. A high percentage of the area consists of Class I and II soils, with few drainage problems. The rainfall in the area is not excessive, but is sufficient not to require irrigation. No additional offsite transportation facilities are required, and the markets of Santa Cruz are within easy reach of the project area. (Refer to Annex III for detailed criteria).

Soils information was obtained from Apreciación Inicial del Potencial del Uso de Suelos de las Regiones del País de Monte Central y de Santa Cruz del Tropico Boliviano, written by Dr. T.T. Cochrane of the British Tropical Agricultural Mission, and verified by James H. Livingston, AID Agronomist, during his TDY in Bolivia in January and February 1974. (Agronomic Intensive Review by James H. Livingston). Specific engineering soils information was obtained from analyses performed by Prudencio, Claros y Asociados, a Bolivian Consultant firm. (See Annex III).

Basic topographic data was obtained from maps provided by the Bolivian Instituto Militar Geografico and from Dr. Cochrane's report.

3. Engineering Plan for Project Execution

a. Planning

In the San Julian area, preliminary layouts and typical sections have been prepared by INC, however due to the dense tropical vegetation, thus far no field surveys have been carried out. Since the general topography, drainage patterns and soil types are known, cost estimates have been developed on a fairly firm basis. These estimates are based on predetermined plot sizes and the length of roads needed to service approximately 4000 families. In the Chané-Independencia area, the estimated amount of improvement was made by field inspection of the existing roadway.

b. Design and Preparation of Contract Documents

The final design and survey of the roads will be done

under the supervision of Servicio Nacional de Caminos (SNC) personnel. Due to the heavy work load of new highway construction now underway in SNC, technical personnel will be contracted by SNC to design and inspect the construction. At the present time no consulting services are anticipated; however, should SNC be unable to dedicate the required amount of attention to complete the plans and specifications within the time schedule projected, it may be necessary to contract a local engineering firm for this purpose. These services will be financed with loan funds.

The penetration roads will be designed for a 8 ton (HLO) axle load, while the access trails will not be designed for any specified loading. Design of the buildings will be done by the Ministry of Agriculture/INC and the Ministry of Health. Both Ministries have adequate experience and personnel to perform this service.

c. Public Bidding

i) Penetration Roads

Upon completion of the design and preparation of the contract documents, bids for the construction contract will be called for from Bolivia and AID Code 941 countries. An announcement will be sent to the Commerce Business Daily, and to the local press for publication. Award will go to the lowest responsive bidder pursuant to the AID Capital Project Guidelines.

ii) Buildings

Bids will be called for from local contractors and award will be made according to Bolivian law.

d. Construction

One construction contract is planned for the construction of the penetration roads. SNC coordinating with INC, will be the contracting agency, and the end product will be accepted by SNC for maintenance. Due to the relatively small size of the contract, it is doubtful if any U.S. construction companies will be interested in the project, however several local firms are capable of successfully building these roads. Pre-qualification will be required for firms planning to submit bids. SNC will supervise and inspect the construction, and be responsible for approving change orders, additional work orders, progress payments, etc. Moreover, INC as the coordinating agency will also approve these documents.

The construction will be scheduled to begin during the dry season, and the contractor working on two fronts should be able to complete the work during a two to three year period.

The construction of the access trails in the San Julian sub-area will be done by INC, with equipment purchased under the loan (See Annex III). The National Community Development Service (NCDS) may build additional access trails in the Chané-Independencia area using established community development procedures.

The agriculture service centers will be constructed by local contract, administered by INC, under the general supervision of the Ministry of Agriculture.

One sanitary post will be constructed and will be included in the contract for the construction of the agriculture service center in the San Julian area.

The wells will be drilled by INC with equipment and materials procured with loan funds.

e. Procurement

At the present time it is anticipated that all procurement for the construction of the penetration roads will be provided by the contractor, however should restraints develop that would make this difficult, materials may be procured by SNC directly from local suppliers or, in the case of crushed rock, from a SNC quarry operation. No direct off-shore procurement is anticipated, however the contractor will undoubtedly procure equipment and spare parts for the road construction from the U. S. or other elegible source country.

Procurement of equipment for the construction of access trails, the perforation of wells and vehicles will follow the AID Capital Project Guidelines procedures.

Office furniture and equipment for the agriculture service centers may be procured from "off-the-shelf" in Bolivia or from other source country, depending on availability and price.

f. Time Provisions

The total time for the completion of the project is four years. For a detailed time schedule see the Critical Path and Bar Chart in Section III and Annex III, respectively, of this paper.

g. Operation and Maintenance

Upon completion of each sector of construction, the corresponding agency will assume operation and maintenance. In the case of the penetration roads, SNC will assume the overall maintenance responsibilities, however the land owners fronting on these roads will be responsible for routine maintenance. SNC hasthe expertise and experience in road maintenance, although at times they lack an adequate budget to maintain roads to standards normally accepted in the developed countries of the world. However, we consider that SNC is one of the most effective and best staffed agencies in Bolivia, and that their highway maintenance is adequate by Latin America standards.

The access trails will be wholly the responsibility of the communities and the property owners fronting on these routes. SNC will not accept the access trails into their system of maintained roads. We anticipate that maintenance will be minimal, sufficient to maintain the trails open for all vehicles in the dry season, and open to animal pulled carts and four wheel drive vehicles during the wet season.

The Ministry of Agriculture will accept, operate and maintain the two service centers constructed under the loan.

The Ministry of Health will operate and maintain the sanitary post. The communities served will be responsible, through the users, to maintain the wells and hand pumps.

All the agencies mentioned above have the proven capability to maintain the facilities mentioned therein.

4. Technical Feasibility

a. General

It is considered that all facets of the project are technically feasible. Physical characteristics of the terrain, climatic conditions, and construction pose no unusual technical difficulties. Soil samples taken from the area indicate that for the most part the soils run from non-plastic to slightly plastic, and apparently are suitable for sub-base material for the penetration roads (see Annex III). This material should also provide a relatively stable material for the dry weather access trails.

Access to both sub-areas of the settlement project is available to the Chané-Independencia area by paved road from

Santa Cruz; and to the San Julian area by paved road from Santa Cruz to Puerto Banegas, crossing the Rio Grande by "ferrier" and to the project site by a road now under construction but expected to be passable year round by November 1974. The San Julian area is classified as semi wet, receiving 850 to 1300 mm (33-51 in) of rain over a 4 month period from mid-November through mid-March, but with most of the rain concentrated during the months of January and February.

Ample rock is available for the crushed rock surfacing for both sites. A quarry is now operating in the San Ramon area, about 30 km. from the beginning of the road in the San Julian area, and rock is available near the Yapacani River approximately 80 kms. from the beginning of the road into the Chané-Independencia area. Rock is now being used from both areas for road surfacing, but will be analyzed prior to beginning construction.

No difficulties are anticipated in the construction of the Agriculture Service Centers, which will use conventional building materials readily available in the Santa Cruz area markets.

b. Contractors

The construction of the penetration roads may present problems in that there are only three contractors in Bolivia with the capability to complete horizontal type construction in the magnitude of this project. An analysis of the capability and current work load will be made prior to issuing invitations for bids to determine if a single contract should be let, or the project divided into two sub-projects. Although the project will be advertised in the U. S. it is doubtful that a foreign contractor would be interested due to the relatively small size of the contract. Experience within the Mission has indicated that contractors from neighboring countries are not interested in road construction contracts under $10-15 million, and U. S. contractors in projects less than $25-35 million.

In the event that no responsive bids are received for the construction of the penetration roads, SNC will construct them by force account. SNC has had considerable experience and is fully capable of undertaking and successfully completing projects of this type.

No problems are anticipated in obtaining adequate interest in the construction of the Agriculture Service Centers as the Santa Cruz area has numerous small to medium size construction firms qualified in the type of construction.

5. Cost Estimates

Cost estimates for road construction were developed based upon recent construction projects of the same type and magnitude, current material costs, and updated cost information from SNC. As this base data was obtained from projects bid before January, 1974, an additional 28% was added to compensate for an increase in all construction costs in Bolivia in this percentage as set forth in a decree law effective on March 21, 1974. This increase in contract costs was intended to offset certain raises in salary and material costs officially ordered or approved by the GOB.

INFRASTRUCTURE COST BREAKDOWN

$US

AID LOAN	Chane-Independencia	San Julian	Total
PENETRATION ROADS			
Construction	$ 2,219,000	$ 3,554,000	$ 5,773,000
Engineering	147,000	235,000	382,000
Contingency	222,000	355,000	577,000
Sub-Total	$ 2,588,000	$ 4,144,000	$ 6,732,000
DRY WEATHER ACCESS TRAILS			
Construction	0	$ 1,106,000	$ 1,106,000
OTHER INFRASTRUCTURE			
Service Centers	$ 185,000	$ 185,000	$ 370,000
Sanitary Post	0	13,000	13,000
Water Points	0	277,000	277,000
Sub-Total	$ 185,000	475,000	660,000
TOTAL AID LOAN	$ 2,773,000	$ 5,725,000	$ 8,498,000
LOCAL CONTRIBUTION			
Penetration Roads	$ 94,000	80,000	174,000
Access Trails	0	468,000	468,000
Agric. Serv.Centrs.	27,000	27,000	54,000
Sanitary Post	0	3,000	3,000
Water Points	0	48,000	48,000
TOTAL LOCAL CONTR.	$ 306,000	626,000	932,000
TOTAL	$ 3,079,000	$ 6,351,000	$ 9,430,000

All costs estimates are based on current costs, taking into consideration a 7.5% annual rate of inflation, and on construction taking place as indicated in Annex III. A drastic change in the inflation rate due to unforeseen factors, or an unusual delay in commencing construction could render this estimate unrealistic.

6.. Engineering Conclusions

Data concerning the road construction is minimal. Soils analyses have been made on the alignment of the road in the Chané-Indepedencia area, and in the general area of the road in the San Julian area. (See Annex III). These samples are typical rather than specific, and do not indicate unusual problems in using this material for the sub-base, material for the penetration roads. The project, from an engineering standpoint, is considered feasible. The cost estimate were carefully developed and are considered reasonably firm. It is the judgement of the Capital Assistance Committee that the requirements set forth in Section 611 (a) (1) of the Foreign Assistance Act of 1961, as amended, have been met.

C. Economic Evaluation

1. Benefit Cost Analysis

The method used to evaluate economic returns to the project investment is the standard benefit cost approach. Two separate analysis were made independently, each imploying different methodologies.

The first-described in Annex IV-A developes a net benefit stream for the project as a whole based on a number of simulated farm models which were synthetized from estimated resource endowment, production coefficient, and price data deemed to be relevent for the project area. Alternative models were developed to test the sensitivity to price and labor cost variation. Data thus generated was analyzed in a linear programming framework to estimate optimal farm output under specified resource constraints. Annual net benefits with and without the project were determined with the difference representing the benefit stream attributable to the project inputs. Detailed discussion of the assumption and results of that analysis are found in Annex IV-A and its accompanying exhibits.

The second method relies on observed farm income data from a sample of small farm in various colonization projects in the Bolivian Oriente which is taken to be typical of net returns for farms in the project area. Data adjustments to reflect current price changes and productivity increases were made. The Chane-Piray and San Julian sub-areas were each analyzed separately, - under various assumptions with respect to income growth with and without project inputs. Details of this approach are given in Annex IV-B.

Both methodologies assumed a 20 year benefit stream and 15% discount rate. Similar favorable benefit cost ratios of 2.50 and 2.43 were obtained from the respective methodologies.

2. Contribution to Sector Output

Annual net benefits to the project range from about $6 million in the 10th year to $8.6 million in the twentieth year. Given projected growth rates these estimates represent about 15 percent of the projected output from the small farm sector in the oriente and about 2% of the estimated total value of agricultural output for the country as a whole.

3. Employment Impact

Execution of the project will also have a favorable impact on employment in Bolivia. Aside from the increased work opportunities resulting from the construction activities directly associated with developing project infrastructure, an additional 12,000 man years of labor annually will be required by the agricultural sector alone as the project approaches maturity. Moreover, attractive returns to the family labor of the 5000 new campesino settlers will militate in favor of their remaining in agriculture rather than joining the ranks of urban job seekers.

Development of the agricultural production capability will have a favorable multiplier effect on the agricultural services sector as well especially those involved in transportation and marketing. While it is impossible to estimate the total employment impact as a result of the project, it is clear that this investment will generate a strong demand for unskilled labor from the lowest income classes and thus have a favorable effect on the income distribution pattern of the country.

4. External Debt Service Capacity

The marked improvement in Bolivia's export earnings in the latter half of 1973 and the prospective improvement resulting from higher world prices for new major exports have expanded Bolivia's debt acquisition capacity, at least temporarily. However, the improvement in the terms-of-trade must be considered temporary in view of the probability that import prices will rise relatively sharply over the next year and given the sensitivity of mineral and agricultural exports to world price fluctuations. On the realistic assumption that Bolivia's import substitution and export diversification efforts will bear fruit only slowly, we estimate that Bolivia's debt accumulation capacity will continue to be hampered by potential world price fluctuations for Bolivia's major exports. Moreover, the relatively small petroleum reserve, assuming no further discoveries, augurs for only modest increases in the exportable surplus given the incremental growth in domestic consumption which can be expected as stronger industrialization efforts take place. Indeed, increasing resort to other energy resources or a reduction in world demand for petroleum/gas resources would

quickly reverse the positive impact on Bolivia of the recent surge in raw material prices. Thus, on the whole, Bolivia's requirements for medium/long-term borrowings will remain necessary for development.

The present favorable estimate of $541 million for 1974 exports could be reduced to the $500 million level in 1974 if mineral prices were to decline by an average 28% over the mid-April, 1974 highs. (Even if this decline were to occur, there would still be a weighted average increase of about 60% over the 1973 average price level). Indeed, a decline to $500 million would not appear unlikely given present uncertainties. Further, the Mission has estimated the effect of a 30% decline in the world price of tin and zinc (using recent price quotations) and substantially smaller declines for other mineral exports. A reduction of US$ 118 million would be implied by these relatively marginal price adjustments.

The following table gives our longer range projections for exports.

Export Projections (FOB)

	Favorable	Unfavorable
1974	541	500
1975	595	530
1976	655	562
1977	721	596
1978	793	632
1979	872	670
1980	959	710

The assumptions governing the favorable estimate for 1975 are: 1) no reduction in the average world prices for Bolivia's major exports from the estimated 1974 level; 2) export volume increases of 5% for petroleum/gas, 10% for agricultural commodities, and 10% for minerals; and 3) service payments increasing by about 2% which reduce the FOB value of exports. Thereafter, the Mission estimates that export growth will obtain an average annual 10% rate of increase.

Assumptions governing the unfavorable option for 1975 are: 1) an average decline of 28% from the recent highs of world mineral prices; 2) unchanged export volumes from the 1974 Mission estimate; 3) 2% increase in service payments and 4) maintenance of 1974 estimated world prices for petroleum and agricultural exports.

Thereafter, a six percent growth is assumed.

Due to Bolivia's substantial accretion of short/medium term loans during 1972, interest and amortization payments are projected by the Mission to increase in 1974 by 35% in comparison to the estimated 1973 level. Futher accumulations of short/medium term would exacerbate an already undertain situation. The following tables are based on the level of existing debt and our best information on potential new borrowing under consideration.

Debt Service Projection (Favorable Option)
(In Millions of US$)

	Exports(FOB)*	Interest	Principal	Total	Ratio
1974	541	27	57	84	16
1975	595	36	60	96	16
1976	655	38	64	102	16
1977	721	40	68	108	15
1978	793	41	74	115	15
1979	872	41	72	113	13
1980	959	40	68	108	11

Debt Service Projection (Unfavorable Option)
(In Millions of US$)

	Exports(FOB)*	Interest	Principal	Total	Ratio
1974	500	27	57	84	17
1975	530	36	60	96	18
1976	562	38	64	102	18
1977	596	40	68	108	18
1978	632	41	74	115	18
1979	670	41	72	113	17
1980	710	40	68	108	15

Source: IMF and Mission estimates.

The real resource requirements to meet amortization and interest payments, assuming a real growth rate of 8% in 1974 and 5% thereafter, would remain within adequate margins.

Domestic Resource Requirement
to Meet External Debt Payments

	GDP(Constant 1968 Pesos)	U.S. Dollars	Interest/ Principal	Ratio
1974	13984	685	84	12
1975	14683	720	96	13
1976	15417	756	102	13
1977	16188	794	108	14
1978	16997	833	115	14
1979	17847	875	113	13
1980	18739	919	108	12

* Converted at 20.40 pesos per dollar.

From the above the Mission concludes that there are reasonable prospects of repayment of this loan given the future prospect of Bolivia in terms of growth and debt service capacity. Nevertheless, it is also concluded that the prospects are such as to indicate a need for concessional financing of social and economic development projects of the type herein considered well into the indefinite future.

D. Financial Soundness

1. Summary Cost Estimate and Financial Plan

The total cost of the overall project and the proposed sources of financing are presented by the following table:

	(US$ 000)			
Utilization of Project Funds	AID Loan	AID Grant	Local Financing	Total
Roads	7,838	-	792	8,630
Production Services	990	-	534	1,524
Social Services	327	-	343	670
Project Administration	240	150	625	1,015
Project Location	250	-	3,160	3,410
Total	9,615	150	5,454	15,249

2. Analysis of Elements Included in Financial Plan

The following table presents reasonably firm estimates of the component costs of the project broken down between U.S. Dollars and local currency:

	(US$ 000)		
	U.S. Dollars	Local Currency	Total
1. Roads	3,915	4,715	8,630
2. Production Services	143	1,381	1,524
a. Agricultural Service Center	143	701	
b. Credit	-	680	
3. Social Services	314	356	670
a. Potable water	277	48	
b. Health Posts	12	183	
c. Orientation	25	125	
4. Project Administration	365	625	1,015
a. Administration Support	40	520	
b. Technical Assistance	350	-	
c. Titling Administration	-	105	
5. Project Location	250	3,160	3,410
a. Land	-	3,000	
b. Land Resettlement Study	250	160	
Total	5,012	10,237	15,249

Foreign exchange currency, about 33% of total project costs, will be used for equipment, imported construction materials and technical assistance. Local currency will finance local currency costs such as land, locally produced construction materials, road design, road construction services, etc.

3. Project Costs by Sub-Area

Project financing, including AID, GOB, community and other donors contributions, are shown in total and by sub-area on the following table:

	(US$ 000)		
	Chané/Piray Sub-area	San Julian Sub-area	Total
Project Infrastructure			
Land	-	3,000	3,000
Roads	3,469	5,161	8,630
Agric. Service Center	272	272	544
Health Posts	-	25	25
Potable Water	-	325	325
Sub-Total	3,741	8,783	12,524
Production & Social Services			
Research & Extension	100	100	200
Training	50	50	100
Orientation	-	150	150
Credit	300	380	680
Titling	15	90	105
Operating Expenses-Health Posts	100	70	170
Sub-Total	565	840	1,405
Project Administration			
Administ. Support	250	310	560
Technical Assistance	50	300	350
Land Research Study	-	410	410
Sub-Total	300	1,020	1,320
Total	4,606	10,618	15,249

4. Disbursement Schedule

The source and timing of the projected funds disbursements is presented in the next table:

(US$ 000)

Source	Year 1	Year 2	Year 3	Year 4	Total
1. AID					
a) Loan	1,379	2,211	3,083	2,972	9,645
b) Grant	25	50	50	25	150
2. Local Contributions					
a) GOB	3,386	676	706	336	5,104
b) Community	37	37	38	38	150
c) Other Donors	45	65	65	25	200
Total	4,872	3,039	3,942	3,396	15,249

5. Summary of Elements Included in the Financial Plan & GOB Contribution

a. Sources of financing of the project

The following is a table of the various sources of financing and the percentage relationship of each to the total project cost of $15,224,000.-:

Source	Amount	%
A.I.D. Loan	$ 9,645 ,000	63.0
A.I.D. Grant	150,000	1.1
Government of Bolivia	5,104,000	33.5
Community Contribution	150,000	1.1
Other Donors	200,000	1.3
Total Project	$15,249,000	100.0

The GOB contribution will be in the form of land, now the patrimony of the State, which will be transferred first to INC and later to the individual

settlers, operating costs including some salaries of entities working on the project, and operating costs of INC in opening up dry-weather access trails. Personnel costs are for those individuals assigned directly to the project from Agricultural Extension, INC and SNDC. Some project costs provided for the project by the GOB will also be for land titling and in support of the land resource study.

A conservative land valuation was set at $15.00 per hectare for the land being opened for colonization in the San Julian area. Lumbering concessions for virgin land north of Santa Cruz have recently been sold by the GOB for from $15 to $25 per hectare. Cleared land, near Santa Cruz with good access most of the year sells, in private sales, at $200 per hectare and up.

6. Justification for use of A.I.D. loan terms

As an exporter of metals, petroleum and gas, Bolivia foreign exchange earnings should increase substantially in 1974. This situation, however, does not mean that Bolivia's need for concessional assistance is less. If the expected foreign exchange gain were distributed equally throughout the population, per capita income, which was about $188 per year in 1973, would be increased by $10 and would still be very much the lowest in South America.

Moreover, increased foreign exchange earnings expected in 1974 will be needed to pay higher prices for imports, make income producing investments in the mining and petroleum sectors and increase reserves against the possibility of a return to a current account deficit position in 1975.

Given the probable exceptional nature of Bolivia's foreign exchange earnings, it would not be in the country's development interests to finance a substantial part of its investment requirements during the financial planning period by extensive foreign borrowing on medium or short-terms nor should the international financial institutions restrict Bolivian access to more concessional terms and hence push the country toward an excessive debt burden counter-productive to development.

The project in question is primarily of social and long-term development concern, of undoubted economic benefit but not immediately productive of a government return and hence fully appropriate for concessional international financing at the terms indicated.

The Mission has reported fully on this development separately.

SECTION III - LOAN ADMINISTRATION

A. Target Dates

1. Execution of the Loan Agreement

No delays are foreseen in drafting and negotiating a loan agreement. It is expected to be signed within two months following loan authorization.

2. Conditions Precedent

The Project Committee anticipates that conditions precedent to disbursement of the loan will be satisfied within four months following loan signing. However, it is essential that the GOB initiate two activities - the road survey and detailed soils studies - as soon as possible (see critical path discussion). Thus, upon satisfaction of conditions precedent, it is proposed that A.I.D. retroactively reimburse the GOB for such eligible contracted services. The A.I.D. loan agreement would accordingly include as an eligibility date the date of loan authorization.

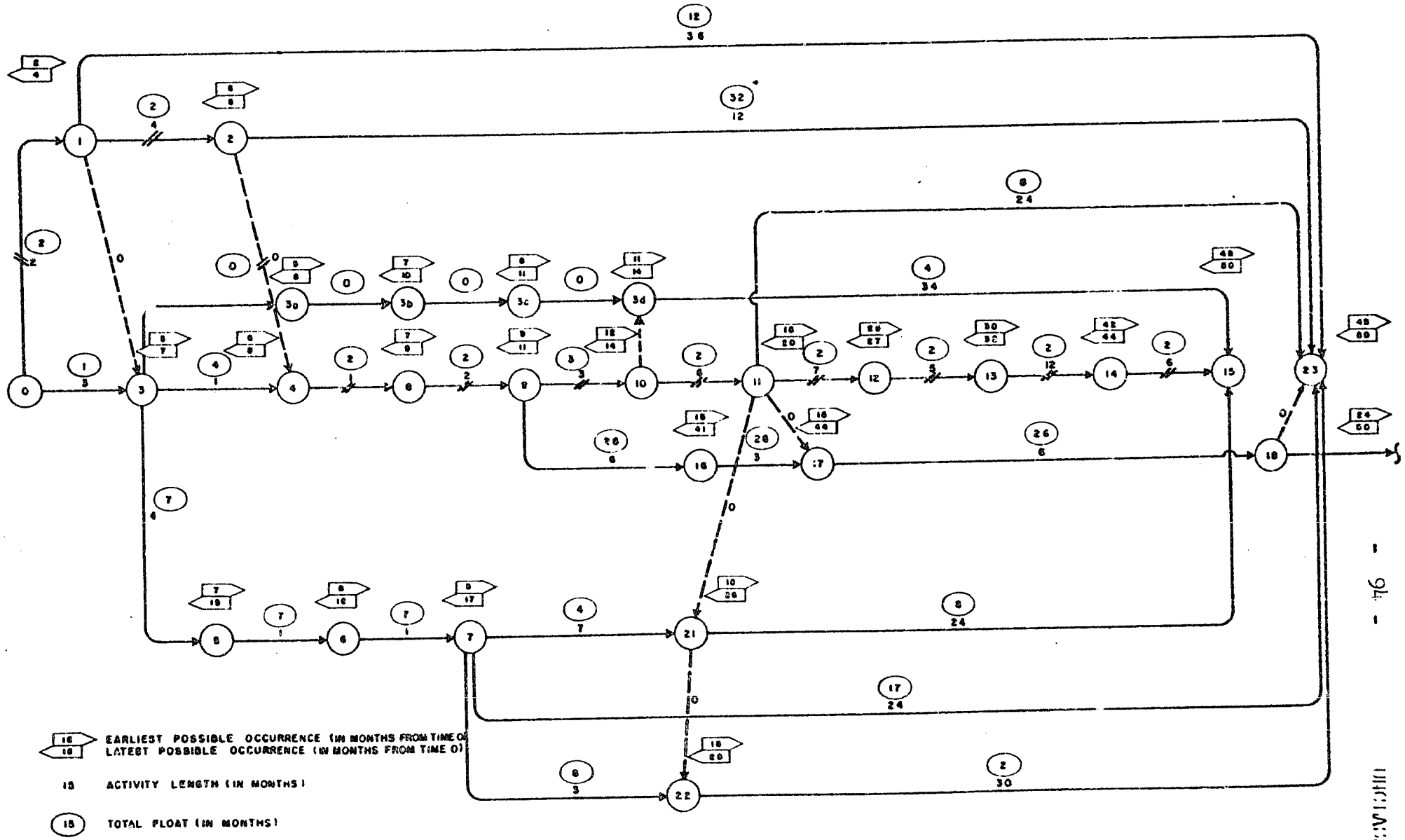
3. Engineering and Construction Schedule

The bar chart located in Annex III indicates target dates for initiation and completion of key surveying, procurement and construction activities. The overall time-frame for completion of the project is projected at 48 months.

4. Critical Path

As recommended in the IRR approval cable, a critical path chart has been prepared for the project in the San Julian area to determine the interdependence of all major activities to be undertaken. The critical path diagram is located on page 94 however a discussion concerning important implications of the diagram follows.

The project time-frame is largely established by the penetration road, which will require a minimum of 46 months after the loan is signed to complete. The road survey must start immediately after loan authorization to take advantage of the dry season. This is also true of the soils survey, and any delay in these two items could cause up to a one year delay in project completion. All dates on the diagram consider that at least two months per year are totally unworkable and two months partially unworkable due to climatic conditions.



NEW LANDS PROJECT SAN JULIAN SUB-AREA

CRITICAL PATH DIAGRAM

DECLASSIFIED

NEW LANDS DEVELOPMENT
CRITICAL PATH PROJECT ANALYSIS
(San Julian Sub-Area)

OPERATION NAME	OPER. NUMBER	DURATION (Months)	EARLIEST START	EARLIEST FINISH	LATEST START	LATEST FINISH	FLOAT TOTAL	FLOAT FREE
Loan Authorization	0							
Negotiate and Sign Loan	0-1	2	7/74 0	9/74 2	9/74 2	11/74 4	2	0
Penetration Rl. Survey	0-3	3	7/74 0	10/74 3	8/74 *1	11/74 4	1	0
Compl. Condition Precedent	1-2	4	9/74 2	1/75 6	11/74 4	3/75 8	2	0
Tech. Assist. to IRC	1-23	36	9/74 2	9/77 38	9/75 14	9/78 50	12	12
- Dummy -	2-4	0	1/75 6	1/75 6	3/75 8	3/75 8	0	0
Land Resource Study	2-23	12	1/75 6	1/76 18	9/77 38	9/78 50	32	32
Bid Documents Heavy Equipment	3-3a	2	10/74 3	12/74 5	3/75 8	5/75 10	5	0
Advertise H. Equipment	3a-3b	2	12/74 5	2/75 7	5/75 10	7/75 12	5	0
Bid/Award H. Equipment	3b-3c	1	2/75 7	3/75 8	7/75 12	8/75 13	5	0
Delivery H. Equipment	3c-3d	3	3/75 8	6/75 11	8/75 13	11/75 16	5	0
Construction of Access Trails	3d-15	34	7/75 12	5/78 46	11/75 16	9/78 50	4	2
Soils Study (Road)	3-4	1	10/74 3	11/74 4	2/75 7	3/75 8	4	2
Soils Study (Agr.)	3-5	4	10/74 3	2/75 7	5/75 10	9/75 14	7	0
Pen. Road Design	4-8	1	1/75 6	2/75 7	3/75 8	4/75 9	2	0
Preparation Soils Map	5-6	1	2/75 7	3/75 8	9/75 14	10/75 15	7	0
Plot Layout	6-7	1	3/75 8	4/75 8	10/75 15	12/75 17	7	0
Plot Survey (1st. 10 Fl).	7-21	7	4/75 9	11/75 16	8/75 13	3/76 20	4	2

* Weather Controls

UNCLASSIFIED

OPERATION NAME	OPER. NUMBER	DURATION (Months)	EARLIEST		LATEST		FLOAT	
			START	FINISH	START	FINISH	TOTAL	FREE
Begin Orientation	7-22	3	4/75 9	7/75 12	12/75 17	3/76 20	8	6
Commerc. Land Sales	7-23	24	4/75 9	4/77 33	9/76 26	9/78 50	17	17
Pen. Rd. Contr.Doc. & Pre-Qualif.	8-9	2	2/75 7	4/75 9	4/75 9	6/75 11	2	0
Pen. Rd. Bid/Award	9-10	3	4/75 9	7/75 12	6/75 11	9/75 14	2	0
Design Agricul.Serv.Cent.& Sanit.	9-16	6	4/75 9	10/75 15	6/77 35	12/77 41	26	0
Pen.Road Constr.(1st. 10 Km) Post	10-11	6	7/75 12	1/76 18	9/75 14	3/76 20	2	0
Dummy	10-3d	0	12	12	16	16	0	0
Pen.Road Construc. (20 Km)	11-12	7	1/76 18	8/76 25	3/76 20	10/76 27	2	0
Dummy	11-17	0	1/76 18	1/76 18	3/76 20	3/76 20	0	0
Locate & Drill Wells	11-23	24	1/76 18	1/78 42	9/76 26	9/7[illegible] 50	8	6
Pen. Road Construc. (15 Km)	12-13	5	[illegible]/76 25	1/77 30	10/76 27	3/7[illegible] 32	2	0
Pen. Road Construc. (10 Km)	13-14	12	1/77 30	1/78 42	3/77 33	3/7[illegible] 44	2	0
Pen. Road Construc. (15 Km)	14-15	6	1/7[illegible] 42	7/7[illegible] 48	3/78 44	9/7[illegible] 50	2	0
Agr. Service Cent & [illegible] Post	16-17	[illegible]	[illegible]/75 15	[illegible] [illegible]	12/77 [illegible]	3/7[illegible] [illegible]	26	0
Cent. Ridge.Serv Cnt.& San. Post	17-18	6	1/[illegible] 18	7/[illegible] [illegible]	3/78 44	9/7[illegible] 50	26	26
Dummy	18-23	0	7/76 24	7/76 24	9/76 50	9/76 50	0	0
Equip., Staff A.C.C. & C.P. & Operate	18-9	Indef	7/76 24		2/76 [illegible]		-	-
[illegible]	[illegible]	24	1/76 18		[illegible]		[illegible]	[illegible]

OPERATION NAME	OPER. NUMBER	DURATION (Months)	EARLIEST		LATEST		FLOAT	
			START	FINISH	START	FINISH	TOTAL	FREE
Orient. Remain Settlers Location of Settlers	22-23	30	1/76 18	7/78 48	3/76 20	9/78 50	2	2

UNCLASSIFIED

The diagram indicates a critical path through the road survey, road soils study, penetration road design, bid and award of contract, and initiation of road construction. All vertical construction must wait until the penetration road construction is started in July 1975. For example, before construction of the agricultural service center and first sanitary post can proceed, at least 10 kms. of road must be in place. However, a mobile health unit will be provided during the period prior to the construction of the post. Sufficient lead time exists to prepare plans, specifications, etc.for these buildings during the period preceding the opening of sections of the penetration road.

It should also be noted that the preparation of bid documents for the equipment necessary to construct the access trails and perforate wells should begin as soon as possible in order not to delay the implementation of these two activities, which would in turn delay the location of the settlers in the area.

Several independent activities, such as the land resource study and the sale of commercial land, have a long float time, and may take place early or late in the overall project time framework.

The critical Path Diagram has been discussed with INC representatives and will serve as preliminary project implementation plan.

B. Disbursement Procedures

No deviation from A.I.D. established disbursement procedures is anticipated. Materials and equipment procured in the United States or other Code 941 countries and any foreign exchange costs of engineering, construction, and technical assistance contracts will be paid through A.I.D.'s standard letter of commitment/letter of credit procedure. Requests to open letters of commitment will contain appropriate certification that the items listed are required for the project and are eligible for financing under the loan. Disbursement for approved local currency costs will be made from a U.S. government owned RDO account in the Central Bank.

C. Procurement Procedures

Goods and services procured under the loan shall have both their source and origin in countries included in Code 941 of the A.I.D. Geographic Code Book and Bolivia and procurement will be made in accordance with standard A.I.D. procedures. Appropriate reports will

be required from the INC Project Coordinator concerning compliance with procurement requirements such as source and origin, 50/50 shipping, etc.

Specifications for procurement will be prepared by SNC (in the case of the penetration roads) and INC and reviewed by USAID engineers. When appropriate, AID/W assistance with specifications and procurement will be requested.

D. USAID Monitoring Responsibilities

Monitoring will be exercised by a Mission Project Committee with the following responsibilities:

1) The primary monitoring task will rest with a full-time Project Supervisor who will work under the Mission Rural Development Division (RDD) one of whose memberswill be the Project Manager. As previously stated, the Mission intends to contract this individual with grant funds for a three year period. The Project Supervisor will maintain daily contract with INC's Project Coordinator, will frequently visit the project sites, will assist with project implementation, and will call any problems to the attention of the Project Manager and other appropriate USAID officers.

2) The Mission's Engineering and Transportation Division (ETD) will review all procurement lists, plans and specifications, and will periodically inspect construction progress.

3) The Mission Controller will review disbursement/reimbursement requests for conformity with A.I.D. regulations and will ensure that adequate financial control methods are followed.

4) The Mission Office of Capital Development (CAP) will have responsibility for chairing the Mission Project Committee and ensuring that provisions of the A.I.D. Loan Agreement and Implementation Letters are met.

Annual evaluation meetings will be held between Mission personnel and the representatives of the participating entities. These meetings will review the activities of the INC Project Coordinator's evaluation staff, the physical progress of the project, and progress toward the attainment of the project purposes. Specific evaluation criteria will be developed by the technical advisor contracted to establish the evaluation system to be implemented by the Project

Coordinator. Based on these meetings, an annual evaluation report will be submitted by USAID to AID/W.

E. Reports

The following reports will be required:

1. As annual audit report, prepared by an independent auditor acceptable to AID, will be submitted yearly to USAID/Bolivia, by the INC Project Coordinator.

2. Quarterly shipping reports will be required from INC.
3. Quarterly progress reports will be submitted by from the INC Project Coordinator.
4. Other reports which may be required (such as progress reports from consultants and technical assistance advisors) will be specified in implementation letters.

F. Conditions and Covenants

In additions to the standard conditions and covenants of A.I.D. lending, the Loan Agreement should include the following:

1. Conditions

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

(i) evidence that the lands to be transferred to settlers are subject to no easements or other uses of third parties which might unreasonably interfere with the settlers' use and enjoyment of the lands;

(ii) evidence of adequate staffing in the National Colonization Institute (INC); and

(iii) a plan for the promotion of colonization in the Project area.

b. Prior to any disbursement or issuance of any commitment documents under the Loan for any purpose other than to finance

consulting engineering, design, or technical assistance services, Borrower will submit to A.I.D., in form and substance satisfactory to A.I.D.:

(i) evidence of the creation of a coordinating mechanism that will include a revised Operations Committee and the appointment of a project coordinator for the INC;

(ii) agreements among those GOB ministries and agencies participating in the execution of the Project, setting forth their roles, responsibilities and contributions to the Project;

(iii) evidence of adequate provision for orientation of new settlers in the Project area;

(iv) a statement of the criteria settlers must meet in order to be eligible to receive title to their lands; and

(v) to formalize a small farmer credit mechanism for the project area which involves the Bolivian Agricultural Bank, and the Agricultural Extension, Credit and Cooperative Development Agencies; and

(vi) to limit the role of INC in GOB colonization efforts to those activities which are generally associated with pioneer colonization, while leaving the longer term, consolidation activities to other governmental agencies, thereby freeing INC to move on to other colonization projects.

2. Covenants

Except as AID may otherwise agree, the Borrower shall covenant:

(i) to effect necessary staffing changes and additions on a timely basis;

(ii) to review the progress of the Project annually with AID in accordance with a mutually agreed upon implementation plan;

(iii) to develop and execute a land use policy, within six months of the completion of the land use survey, which, among other things,

(a) acknowledges the findings of the land use survey,

(b) sets aside lands for future settlement projects, and

(c) outlines a framework for the development of those lands set aside;

(iv) to provide adequate support to the research and extension staff in the project area; and

(v) to formalize a small farmer credit mechanism for the project area which involves the Bolivian Agricultural Bank, and the Agricultural Extension, Credit and Cooperative Development Agencies; and

(vi) to limit the role of INC in GOB colonization efforts to those activities which are generally associated with pioneer colonization, while leaving the longer term, consolidation activities to other governmental agencies, thereby freeing INC to move on to other colonization projects.

G. Evaluation Plan

A.I.D. will expect the implementation and evaluation plans, which the Borrower, through INC, will have to submit to meet a condition precedent, to provide a means for ascertaining progress toward various project targets, as well as end-of-project status of the loan.

Physical indicators of progress, including the necessary interim benchmarks, are established in the Critical Path Diagram and the Engineering and Construction Schedule in Annex III. These are to be reviewed and revised on a regular basis. In addition, however, it will be necessary to establish progress and end-of-project indicators pertaining to the effect which the loan is expected to have on the GOB, the campesions and on the agricultural regions to be developed.

Evaluation indicators will have to come from a variety of sources. They will need to measure progress toward the settlement goals and, for the first two years, the rate of abandonment in the Chane-Piray area. While it is unlikely that much in the way of acutal settlement data will be available within the first two years, it should be possible to develop proxy indicators which will reflect whether future development is likely to proceed along anticipated lines.

Among the types of information to be reviewed are certain institutional changes expected in the INC, including a shift of INC policy, and a related shift in the use of resources, away from provision of social services to old projects toward the planning of new projects and the focusing of GOB attention on the problems of pioneer activity as a whole.

Economic evaluation and measurement of progress during and after the project will be relatively easy. We have calculated, as part of the benefit cost calculations, what family revenues, product output, prices, on farm consumption and return to on-farm labor are expected to be. These estimates are made for each year over the first ten years of settlement. Comparison of acutal results with these estimates will be given strong indications of both progress and ultimate chances of success.

Other indicators which need to be developed include reflections of economic, social and institutional conditions or changes which hopefully will signal the success (or potential failure) of the project. Included in these, among others, are off-farm income (both absolute and as a share of total income), availability and use of credit, effectiveness of the market mechanism in the Santa Cruz area, institutional capability of the various institutions to be involved in the scheme, establishment of the necessary social services facilities and the delivery of such services to the settlers, etc.

The Borrower, specifically the INC, will need help in developing such a plan. They will particularly need assistance in the establishment of goals, collecting base line data and planning the interviewing and other data collection efforts involved in the annual evaluation review with USAID and with other elements of the GOB. The cost of technical assistance in developing this plan, estimated at $50,000, will be loan financed.

SECTION IV - ENVIRONMENTAL ASPECTS

A. Summary

The project consists of helping small farmers (30-40 hectare plots) to colonize 200,000 hectares of virgin forest land and to accelerate the agricultural development of a second area of similar size, both areas in the Santa Cruz region of Bolivia.

All aspects of the project that could affect the environment, both human and natural, were investigated. It was determined that there were no elements present for atmospheric contamination, except for an ephemeral pollution caused by burning off crops and natural vegetation. No population centers are planned which could create waste disposal problems. Using the existing agriculture practices in the areas as a basis for future utilization of fertilizers and pesticides, it is expected that usage of both these items will be minimal; and that nearly 100% of the pesticides used will be organic phosphates, eliminating the possibility of noticeable pollution of the sorounding rivers.

The natural slope of the area to be developed runs between 1% and 2%, minimizing soil erosion by water; and the tropical climate will guarantee vegetation cover on that land not under cultivation eliminating the possibility of serious erosion caused by the occasional strong winds in the area.

Although this project will definitely commit natural forest land to be cleared and cultivated and the consequent loss of existing flora and fauna, the alternatives are less desirable. Bolivia is currently suffering shortages in basic crops, which required the importation of approximately $40 million of basic foodstaffs during 1973. To increase the production of land now under cultivation would require a heavy usage of both fertilizers and pesticides, creating contamination problems to the watersheds.

The settlers in the colonization areas not only have the opportunity to better their economic positions, but studies of other colonization projects indicate notable improvement in education level and general wellbeing.

It is our conclusion that the proposed project will have a minimal adverse effect on the natural environment, and a definite beneficial effect on the human environment.

B. Environmental Analysis

1. General

The project analysis was carried out by USAID/Bolivia personnel, GOB personnel, and TDY personnel from AID/W. The environmental analysis was prepared by R. D. Dudley, Chief Engineer of USAID/Bolivia, with information obtained from Mission Staff, maps and reports from various public and private entities, and verbal information from various sources within Bolivia.

2. Project Description

A detailed project description is contained in the text of the CAP; however, an abreviated description follows.

The project consists of: 1) opening of 200,000 hectares of virgin land for agriculture by small farmers, and 2) providing certain services and infrastructure to an adjacent area already inhabited by small farmers in order to enable the landholders to increase their crop/livestock production.

The virgin area is densely timbered, and consists primarily of class I and II soils, (77%), the natural slope of which is less than 2%, with the exception of a small area near the San Julian river. It is anticipated that this land will be cleared during a period of 5 to 10 years, cultivated crops replacing natural vegetation as it is cleared. The project will finance the construction of a penetration road (100 kms) the improvement of an existing penetration road (80 kms), and access roads (800 kms), as well as buildings to provide certain basic services, potable water wells and credit and extension services. The penetration roads will be surfaced with crushed rock for all-weather usage with minimal drainage structures, and the access trails will merely be a raised dirt platform with no surfacing other than local select material.

3. Environmental Problems Involved

All aspects harmful to the environment have been investigated and an analysis follows:

a. Contamination of Water

Due to the definitely rural aspect of the area, it is anticipated that no contamination of the adjacent rivers

will be caused by untreated sewerage, as each 30-40 hectare plot will dispose of its own sewerage through burial, or eventually, through septic tanks and leaching systems. Although the use of fertilizers and insecticides could contaminate the rivers through run off, their use will be minimal and would not be notable for many years.

Approximately 300,000 hectares of developed farm land upstream from the three rivers involved are currently being farmed, of which only 70,000 hectares are using insecticides, almost all of which is in cotton. The total use of insecticides is about 100,000 gallons per year, 99 percent of which consists of organic phosphates which will completely break down within 30 days. Although the sale of DDT is not prohibited, it is estimated that the current use does not exceed 1% of the total insecticides used in the area.

Due to the high natural fertility of the area, very little fertilizer is now used, although in the future usage will increase. Approximately 4% of the land now under cultivation use fertilizers. There are no impoundments of water downstream from the project, nor are any planned at this time within Bolivia, nor, to our knowledge, in Brazil.

Considering established colonization patterns, it is anticipated that the area covered by this loan will use little or no pesticides or fertilizer for the next 5 to 10 years. Thus, based on the above, we do not consider that this project will either cause or aggravate contamination of the watersheds.

b. Contamination of the Air

As the project does not anticipate any large commercial enterprises, such as processing plants or factories, no significant contamination of the atmosphere will take place. Burning off the undergrowth and crops will cause an ephemeral contamination, but without lasting effect.

c. Erosion

The project area, in the large part, consists of terrain with natural slopes not less than 1% nor greater than 2%. The areas around the banks of the river are inundated during the wet season, and will not be included in the project. Therefore there should be no appreciable amount of erosion by water caused by the development in the project area.

The Santa Cruz area receives winds up to 50 mph during the late winter. These winds are usually intermittent and of short duration. Normally during this period stubble from the crops remain in the field, and there is no history of notable erosion of the cultivated land as a result of these winds. However, windbreakers are included in the project to eliminate any possibility of land erosion by wind.

4. Irreversable Commitment of Resources

The virgin area to be developed now consists of densely vegetated rain forest. The proposed project, during a period of 5 to 10 years, would deforest 90% - 92% of the area, the remaining being left in its natural state, primarily for wildlife reserves. In the area between the San Julian and Rio Grande Rivers, the clearing will represent about one third of the forested area, and when adjacent areas in the department of Santa Cruz are included, the percentage drops to less than 10%, a large amount of which will never be cleared due to the unsuitability of the area for crops or livestock.

As the land is gradually cleared, most of it will be cultivated and crops planted. We do not anticipate more than 10% of the cleared land at any one time to not be under cultivation or without natural vegetation.

5. Alternatives

Considering the economic condition of Bolivia and the shortages of food for domestic consumption, it becomes mandatory that more of the potential prime farm land be brought into cultivation.

Several areas were considered during the initial stages of the proposed project, all of which would require deforestation equal to the selected area.

Other areas, primarily south of the city of Santa Cruz, are not heavily forested and are available for cultivation. However, due to the lack of rainfall, an extensive irrigation system would be required as well as a longer road system. We estimate that each 30-40 hectare plot would have required about $10,000 for irrigation facilities alone, while the selected project requires none. Based on these expenses the described project area was selected, leaving open the drier

area for large commercial farmers who would be able to finance the required improvements.

As an alternative to opening new lands for agriculture, Bolivia could import more foodstuff, which would aggravate historical balance of payments problems and a second alternative would be increased use of fertilizers to increase the per acre output of existing farm land. Neither of these solutions would serve Bolivia, nor be more than a short term answer to a long term problem.

6. Social Aspects of the Project

The text of the CAP treats the social aspect in detail, however a short summary of the beneficial aspects of the human environment will be given herein.

By making available up to 80 acres of choice farm land for each Campesino settler, many of whom now are landless or live on small plots of marginal or sub-marginal land on the Altiplano and upper valleys, the social benefits far outweigh any ecological disadvantages. Experience has indicated that a high percentage of colonists have not only improved their annual income, but also have improved their education level, health and general wellbeing. Some temporary disadvantages may occur, especially with the Campesino from the Altiplano. He will be required to learn to cultivate different crops; adjust himself to a different climate; and perhaps be exposed to different illnesses. However, statistics indicate that most of the highland people adapt to the sub-tropical areas, and that there is no significant difference in the mortality rate of the Altiplano Indian regardless of area, although the morbidity rate may be somewhat higher during the first 3 year period in the lowlands. The Ministry of Health will provide a vaccination program to the settlers which will immunize them against the more serious deseases such as yellow fever, and an orientation course which will stress sanitation and other precautions to be taken to prevent serious tropical illnesses.

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

I, John R. Oleson, the principal officer of the Agency for International Development in Bolivia, having taken into account among other factors the maintenance and utilization of projects in Bolivia previously financed or assisted by the United States, do hereby certify that in my judgement Bolivia has both the financial capability and human resources capability to effectively maintain and utilize the capital assistance project: SUB-TROPICAL LANDS DEVELOPMENT.

John R. Oleson

John R. Oleson
Director USAID/Bolivia

La Paz,
Mayo 9, 1974

Ministerio de Asuntos Campesinos
y Agropecuarios
BOLIVIA

A: John R. Oleson, Director de USAID/Bolivia

DE: Ministro de Asuntos Campesinos y Agropecuarios

OBJETO: Solicitud de Asistencia Financiera Externa de A. I. D. para el Programa de Desarrollo de Nuevas Tierras.

El Gobierno de Bolivia (GOB), mediante el Ministerio de Asuntos Campesinos y Agropecuarios (MACAG) ha desarrollado un programa basado en principios de efectividad máxima de costos para la consolidación de un área de colonización existente y la colonización de un área de terreno virgen por parte de pequeños agricultores en la región del oriente boliviano al norte de Santa Cruz. El análisis del Gobierno de Bolivia de las necesidades de desarrollo agrícola de Bolivia que todavía no es final, claramente indica que debería darse alta prioridad al desarrollo de tierras de potencial productivo en el oriente y la creación de nuevas oportunidades para pequeños agricultores del Altiplano y de los valles montañosos altos.

El programa de colonización será ejecutado por el Instituto Nacional de Colonización (INC) con la activa participación de los Servicios de Extensión e Investigación Agrícola, el

Ministerio de Asuntos Campesinos
y Agropecuarios
BOLIVIA

Servicio Nacional de Desarrollo de la Comunidad (SNDC), el Banco Agrícola de Bolivia (BAB), el Servicio Nacional de Caminos (SNC) y el Servicio Geológico Boliviano (GEOBOL). He consultado con aquellas entidades que no están bajo mi supervisión y he recibido su compromiso de participar en el programa de colonización. Los elementos esenciales de este programa incluirán:

1. El mejoramiento de 80 kms. aproximadamente del camino existente en el área de Chané/Piray y la construcción de 100 kms. aproximadamente de caminos nuevos y el desarrollo de 800 kms. aproximadamente de senderos de acceso en la zona de San Julián;

2. La construcción de un centro de servicio agrícola en cada una de las áreas Chané/Piray y San Julián que promoverán asistencia en actividades de investigación agrícola, extensión y entrenamiento de métodos de producción, desarrollo cooperativo, crédito y titulación de tierras a los pequeños agricultores de estas regiones;

3. La perforación de un número suficiente de pozos de agua potable en el área del proyecto para abastecer las necesidades de 5.000 familias de pequeños agricultores, aproximadamente;

Ministerio de Asuntos Campesinos
y Agropecuarios
BOLIVIA

4. La construcción de una pequeña posta sanitaria y la compra de una unidad sanitaria móvil para satisfacer las necesidades iniciales de servicios sanitarios básicos en el área de San Julián;

5. La implementación de un programa de orientación que proporcionará al colono que ingrese al área de San Julián la información y asistencia necesarias que ayude a él y su familia a acomodarse a su nuevo medio ambiente;

6. La provisión de soporte administrativo y asistencia técnica al INC; y

7. La ejecución de un estudio de recursos de la tierra para determinar la conveniencia de otras áreas en el oriente para futuros proyectos de colonización.

A fin de ayudar en la coordinación de la contribución de las diferentes entidades que participan en el programa, me permito proponer la reorganización del Comité de Operaciones existente dentro del MACAG para incluir al Sub. Secretario del Ministerio de Asuntos Campesinos y A ropecuarios, como Presidente, al Director del INC como Vice-Presidente, a los Directores de SNDC, SNRA, BAB y SNC y a los Jefes de los Servicios

Ministerio de Asuntos Campesinos
y Agropecuarios
BOLIVIA

de Extensión e Investigación Agrícola del MACAG. Además el cargo de coordinador del proyecto será creado dentro del INC. La persona que ocupe este cargo será responsable de la administración del proyecto, de la coordinación de la participación de las varias agencias en el proyecto y de hacer arreglos para la evaluación del proyecto. Al hacer ésto, informará al Director del INC, y actuará como secretario ejecutivo del Comité de Operaciones, informando a dicho Comité a intervalos periódicos. Asimismo, tengo la intención de efectuar cualquier otro cambio en la organización o aumentar el personal que se necesite dentro del MACAG a fin de asegurar el éxito del proyecto.

La política del Gobierno con respecto a la tenencia de la tierra se incluye en los Decretos-Leyes 03464, 07442, 07443 y 07765 así como en la Ley del Poder Legislativo de 26 de octubre de 1905. La política descrita en esas disposiciones legales dispone prioridad de acceso a nuevas tierras abiertas en virtud de los programas gubernamentales a favor de pequeños agricultores. El estudio de los recursos de la tierra, a financiarse con los fondos del programa, proporcionará las bases de la legislación que reforzará nuestra política de tenencia de la tierra

nisterio de Asuntos Campesinos
y Agropecuarios
BOLIVIA

en el área de la utilización apropiada de la tierra. Las lecciones aprendidas y la experiencia adquirida en el proyecto de la referencia servirán como base para futuros programas de desarrollo de tierras.

El Gobierno estima que el costo total para llevar a cabo el programa de colonización incluyendo el valor de la tierra y los costos de personal y administrativos a cargo del Gobierno será de US$ 13.4 millones aproximadamente. De esta cantidad, el Gobierno de Bolivia contribuirá aproximadamente US$ 4.0 millones de los cuales US$ 1.0 millones aproximadamente serían adicionales al valor de los servicios del personal del Gobierno de Bolivia y al valor del patrimonio del Gobierno de Bolivia. Otros contribuyentes proporcionarán aproximadamente US$ 150 mil. El Gobierno de Bolivia, por consiguiente, está solicitando un préstamo de la Agencia para el Desarrollo Internacional en la cantidad de US$ 9 millones 250 mil. El plan financiero exacto para llevar a cabo dicho programa será descrito en el convenio de préstamo.

Ministro de Asuntos Campesinos
y Agropecuarios

Ministro de Finanzas

LOAN REQUEST RECOMMENDATION

(Free Translation) La Paz, May 9, 1974.

TO: John R. Oleson, Director USAID/Bolivia

FROM: Minister of Rural Affairs, Agriculture and Livestock

SUBJECT: Request for External Financial Assistance from A.I.D. Settlement Program

The Government of Bolivia (GOB) through the Ministry of Rural Affairs, Agriculture and Livestock (MACAG) under my charge has developed a model program based on maximum cost effectiveness principles for the consolidation of an existing settlement zone and the settlement of a virgin land area by small farmers in the area north of Santa Cruz in the Bolivian oriente. While the GOB assessment of the agricultural development needs of Bolivia is preliminary, it indicates that a high priority should be given to the development of the productive potential lands in the oriente and the creation of new opportunities for the small farmers of the Altiplano and high mountain valleys.

The settlement program will be executed by the National Institute of Colonization (INC) with the active participation of the Agricultural Research and Extension Services, the National Community Development Service (SNDC), the Bolivian Agricultural Bank (BAB), the National Road Service (SNC), the Bolivian Geological Service (GEOBOL). I have consulted with the non-agricultural entities mentioned above and have received their committment to participate in the settlement program. The essential elements of this program will include:

1. the improvement of approximately 80 kms of existing road in the Chané/Piray area and the construction of approximately 100 kms of new roads and the development of approximately 800 kms of access trails in the San Julian zone;

2. the construction of one agricultural service center in each of the Chané/Piray and San Julian areas which will promote agricultural research, credit, cooperative development and land titling assistance to the small farmers of these regions;

3. the drilling of sufficient numbers of potable water wells in the project area to provide for the needs of approximately 5,000 small farm families;

4. the construction of a small health post and the purchase of a mobile health unit to provide for the initial needs for health services in the San Julian area;

5. the implementation of an orientation program which would provide the settler entering the San Julian area with information and assistance needed to help him and his family adjust to their new environment;

6. the provision of administrative support and technical assistance to the INC; and

7. the execution of a land resource study to determine the suitability of other areas in the oriente for future settlement projects.

In order to assist in the coordination of the inputs of the various entities participating in the program, I propose to reorganize the existing Operations Committee within the MACAG to include a sub-secretary of the MACAG as president, the Director of INC as vice-president, the Directors of SNDC, SNRA, BAB and SNC and the Chiefs of the Agricultural Extension and Research Services of the MACAG. In addition, the position of project coordinator will be created within the INC. The individual holding this position will have several responsibilities: he will manage, coordinate and evaluate the project, report his findings to the Director of INC, and act as the executive secretary of the Operations Committee reporting to it at periodic intervals. It would also be my intention to make any other organizational changes or staff augmentations needed within the MACAG to assure the succes of the project.

The GOB's policy with regard to land tenure is included in Decree Laws 03464, 07442, 07443, and 07765 as well as the legislative law of October 26, 1905. The policy described therein provides priority access to small farmers for new lands opened up through government programs. The land resource study, to be financed from program funds, would provide the basis for legislation which would reinforce our land tenure policy in the area of appropriate land uses. The lessons learned and experience acquired in the subject project would serve as the basis for future lands development programs.

The GOB estimates that the total cost of carrying out the settlement program including the value of land and personnel and administrative costs to the GOB, will be approximately $13.4 million. Of this amount, the GOB will contribute approximately $4.0 million of which approximately $1.0 million would be additional inputs for the cost of supporting personnel of the GOB and the balance in the value of the public domain. Other donors will provide approximately $150,000. The GOB is therefore requesting a loan from the Agency for International Development in the amount of $9,250,000. The exact financial plan for carrying out such a program would be described in a loan agreement.

Minister of Rural Affairs, Agriculture and Livestock

Minister of Finance

CHECKLIST OF STATUTORY CRITERIA

(Alliance for Progress)

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 Agencies Appropriations 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;

a. Agriculture, rural development or nutrition

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;

AID 1240-2 (4-74)

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 § 208; §.251(b).*

A. Describe extent to which country is:

(1) Making appropriate efforts to increase food production and improve means for food storage and distribution.	Bolivia is making appropriate efforts with respect to food production, storage, and distribution. This loan will also contribute to these efforts.
(2) Creating a favorable climate for foreign and domestic private enterprise and investment.	The GOB program emphasized creation of a favorable climate for selected foreign and domestic private enterprise and investment. They are seeking special exemptions within the Andean Common Market for certain investments.

AID 1240-2 (4-74)

(3) Increasing the public's role in the developmental process.	The Government continues to take an active role in the developmental process, and in so doing to increase popular participation.
(4) (a) Allocating available budgetary resources to development.	The Government appears to be allocating as much as it is able to development.
(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)	
(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.	The government is making these efforts.
(6) Adhering to the principles of the Act of Bogota and Charter of Punta del Este.	The government adheres to these principles.

(7) Attempting to repatriate capital invested in other countries by its own citizens.	Bolivia has urged repatriation of capital invested in other countries by its own citizens, and is considering active measures to accomplish such repatriation.
(8) Otherwise responding to the vital economic, political, and social concerns of its people, and demonstrating a clear determination to take effective self-help measures.	The government appears to be doing this in an increasingly effective manner.
B. Are above factors taken into account in the furnishing of the subject assistance?	Yes

Treatment of U.S. Citizens by Recipient Country

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 government is not known to be indebted under these circumstances to any U. S. citizen for goods or services furnished or ordered.
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 previous government of Bolivia nationalized two United States mining firms. However, steps have been or are being taken to realize prompt, adequate and effective compensation to the former owners.

AID 1240-2 (4-74)

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,*	Not applicable.
a. has any deduction required by Fishermen's Protective Act been made?	
b. has complete denial of assistance been considered by A.I.D. Administrator?	

Relations with U.S. Government and Other Nations

6. *FAA § 620(a). Does recipeint 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?*	No, the recipient country does not furnish assistance nor fail to take appropriate steps to prevent ships or aircraft under its flag from carrying cargoes to or from Cuba.

AID 1240-2 (4-74)

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?*	Bolivia is not controlled by the international Communist movement according to the Secretary of State.
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?*	Not applicable
9. *FAA § 620(f). Is recipient country a Communist country?*	No.
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?*	No. Bolivia is not engaged in those 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?*	The government of Bolivia has taken adequate measures to prevent the damage or destruction of mob action of U. S. property whenever possible.

AID 1240-2 (4-74)

12.	*FAA § 620(l). If the country has failed to institute the investment guaranty program for the specific risks of expropriation, in convertibility or confiscation, has the A.I.D. administration within the past year considered denying assistance to such government for this reason?*	The government has instituted the investment guarantee 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?*	No, the recipient country does not furnish goods to North Viet-Nam nor permit ships or aircraft under its glag to carry cargoes to or from North Viet-Nam.
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?*	No.
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?*	No.
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?*	Bolivia is in arrears, but not to such an extent as to disenfranchise it in the General Assembly. The Administrator did take the arrearages into account in determining the OYB.

AID 1240-2 (4-74)

17.	*FAA § 481. Has the government of recipient country failed to take adequate steps to prevent narcotic 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 is actively cooperating with USAID public safety advisors, BNDD representatives and other international agencies to take such steps as may be necessary to control drug traffic in Bolivia.
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?*	Not applicable

Military Expenditures

19.	*FAA § 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).)*	The CY 1974 Budget for military purposes represents approximately 16% of total budgeted expenditures of the govenment. Approximately $1.3 million has been budgeted for the purchase of non-sophisticated military equipment.

AID 1240-2 (4-74)

CONDITIONS OF THE LOAN

General Soundness

20.	*FAA § 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 loan terms are reasonable and consistent with United States and Bolivian laws.
21.	*FAA § 251(b)(2); § 251(e).* *Information and conclusion 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 borrower has made an application for loan funded assistance in this activity and there have been assurances that the funds will be used in an economically and technically sound manner.
22.	*FAA § 251(b). Information and conclusion on capacity of the country to repay the loan, including reasonableness of repayment prospects.*	There are reasonable prospects of repayments.
23.	*FAA § 251(b). 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 United States, on reasonable terms.

AID 1240-2 (4-74)

24.	*FAA § 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?*	Preliminary engineering, financial and other plans necessary to carry out the assistance have been prepared. Detailed engineering to be financed by the loan, remains to be done. Reasonable firm estimates have been established.
25.	*FAA § 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?*	The GOB has indicated its willingness to provide the legislation necessary to establish a viable governmental coordinating mechanism (See Annex 1, Exhibit 2).
26.	*FAA § 611(e). 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?*	Yes.

Loan's Relationship to Achievement of Country and Regional Goals

27.	*FAA § 207; § 251(a); § 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;*	This loan will contribute directly to the objectives reflected in items (a), (b), (c), (d) and (e).

AID 1240-2 (4-74)

(e) 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.

28. *FAA § 209. Is project susceptible of execution as part of regional project? If so why is project not so executed?*

This project could not be carried out as part of a regional project since it is designed to promote the development of the area wholly within Bolivia by relocating Bolivian citizens.

29. *FAA § 251(b)(3). Information and conclusion on activity's relationship to, and consistency with, other development activities, and its contribution to realizable long-range objectives.*

This activity has broad significance with regard to the long-range objectives of integrating the rural areas into national economic, social and political life, and of strengthening the economy.

30. *FAA § 251(b)(7). Information and conclusion on whether or not the activity to be financed will contribute to the achievement of self-sustaining growth.*

This project will contribute to the achievement of self-sustaining growth.

31. *FAA § 209; § 251(b)(8). Information and conclusion whether assistance will encourage regional development programs, and contribute to the economic and political integration of Latin America.*

By strengthening the economic base of the rural population in the project area north of the city of Santa Cruz the capacity of Bolivia to participate in regional activities should be enhanced.

AID 1240-2 (4-74)

32.	*FAA § 251(q); § 111. Information and conclusion on use of loan to assist in promoting the cooperative movement in Latin America.*	**Not directly applicable, however, through the NCDS and UCG programs cooperative instructions will be provided to colonists.**
33.	*FAA § 251(h). Information and conclusion on whether the activity is consistent with the findings and recommendations of the Inter-American Committee for the Alliance for Progress in its annual review of national development activities.*	The activity is consistent with such findings and recommendations.
34.	*FAA § 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.*	This loan will make a significant contribution 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 insitutions.
35.	*FAA § 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 directly recognizes and utilizes the needs, desires and capacities of the rural population.

AID 1240-2 (4-74)

36.	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.*	This loan should directly affect all or the things with the exception of (f).
37.	FAA § 619. *If assistance is for newly independent country; is it furnished through multilateral organizations or plans to the maximum extent appropriate?*	Not applicable.

Loan's Effect on U.S. and A.I.D. Program

38.	FAA § 251(b)(4); § 102. *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 and assistance are furnished in a manner consistent with improving the U.S. balance of payments position.*	The loan will have no foreseeable unfavorable effect on the United States economy. Some U. S. products will be imported.
39.	FAA § 252(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.*	Approximately $6.0 million from loan funds will go directly to private enterprise for the design and construction of primary roads. In addition some loan funds may be channeled through ICI's in order to finance procurements from private sources.

40. *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).*	There will be U.S. private sector participation in this project to the extent that some of the loan proceeds will be used to buy materials from U.S. sources or U.S. professional advisory services.
41. *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?*	Professional advisory services of U.S. firms will be utilized to the maximum extent consistent with the needs of the project.
42. *FAA § 602. Information and conclusion whether U.S. small business will participate equitably in the furnishing of goods and services financed by the loan.*	U.S. small business will be invited to participate when appropriate.
43. *FAA § 620(h). Will the loan promote or assist the foreign aid projects or activities of the Communist-Bloc countries?*	No, the loan will not promote or assist the foreign aid projects or activities of the Communist-Bloc countries.
44. *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*	Technical assistance and consulting services will most likely be provided by private sector groups.

whether they are particularly suitable, are not competitive with private enterprise, and can be made available without undue interference with domestic programs.

Loan - Compliance with Specific Requirements

45. *FAA § 110(a); § 208(e). Has the recipient country provided 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 GOB has provided assurances that it will provide at least 25% of the costs of the project for which the loan is to be made (see Annex I, Exhibit 2)
46. *FAA § 112. Will loan be used to finance police training or related program in recipient country?*	No.
47. *FAA § 114. Will loan be used to pay for performance of abortions or to motivate or coerce persons to practice abortions?*	No.
48. *FAA § 201(d). Is interest rate of loan at least 2% per annum during grace period and at least 3% per annum thereafter?*	Yes
49. *FAA § 604(a). Will all commodity procurement financed under the loan be from the United States except as otherwise determined by the President?*	Yes. Code 941 and Bolivian sources will be used for procurement.
50. *FAA § 604(b). What provision is made to prevent financing commodity procurement in bulk at prices higher than adjusted U.S. market price?*	Any bulk commodities which may be procured will be subject to the bid procedure.

AID 1240-2 (4-74)

51.	*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?*	In the unlikely event that Bolivia discriminates against any U.S. marine insurance company, commodities purchased with loan funds will be insured against risks with a U. S. company as required by this section.
52.	*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?*	Not applicable.
53.	*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?*	Not applicable
54.	*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 Mission will ensure that the Borrower is apprised of the availability of excess U.S. Government property and that the Borrower purchases that property which fits its needs.
55.	*FAA § 611(b); App. § 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?*	Not applicable

AID 1240-2 (4-74)

56.	*FAA § 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?*	This requirement will be met by adherence to AID and Bolivian regulations concerning procurement of contractor services.
57.	*FAA § 612(b); § 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.*	No Bolivian pesos owned by the U.S. are available for financing this project. An effort was made during intensive review to ensure that Bolivian sources contributed local currency to the maximum extent possible.
58.	*App. § 113. Will any of loan funds be used to acquire currency of recipient country from non-U.S. Treasury sources when excess currency of that country is on deposit in U.S. Treasury?*	No.
59.	*FAA § 612(d). Does the United States own excess foreign currency and, if so, what arrangements have been made for its release?*	U. S. does not own excess foreign currency in Bolivia
60.	*FAA § 620(g). What provision is there against use of subject assistance to compensate owners for expropriated or nationalized property?*	Assistance will not be used to compensate owners for expropriated or nationalized property.

AID 1240-2 (4-74)

61.	*FAA § 620(k). If construction of productive enterprise, will aggregate value of assistance to be furnished by the United States exceed $100 million?*	No.
62.	*FAA § 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 a transaction?*	No. Any motor vehicles needed, if any, will be imported from the United States, unless other procurement is authorized.
63.	*App. § 103. Will any loan funds be used to pay pensions, etc., for military personnel?*	No loan funds will be used to pay pensions for military personnel.
64.	*App. § 105. If loan is for capital project, is there provision for A.I.D. approval of all contractors and contract terms?*	Yes.
65.	*App. § 107. Will any loan funds be used to pay UN assessments?*	No
66.	*App. § 109. Compliance with regulations on employment of U.S. and local personnel. (A.I.D. Regulation 7).*	Will comply

67. App. § 110. Will any of loan funds be used to carry out provisions of FAA §§ 209(d) and 251(h)?

No.

68. App. § 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.

69. App. § 601. Will any loan funds be used for publicity or propaganda purposes within the United States not authorized by the Congress?

No funds will be used for publicity purposes within the U.S.

70. MMA § 901.b; FAA § 640C.

(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.

Regulations will be complied with.

(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?

No.

DRAFT
LOAN AUTHORIZATION

Provided: from: Development Assistance Funds
BOLIVIA: Sub-Tropical Lands Development

Pursuant to the authority vested in the Assistant Administrator for Latin America 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 1 of said Act to the Government of Bolivia ("Borrower") of not to exceed nine million seven hundred thousand United States Dollars ($9,700,000) to assist the Borrower in financing the United States dollar and local currency costs of a land settlement project in the Bolivian Oriente, ("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 disbursements 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 outstanding 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. Other Terms and Conditions

(a) Goods, services (except for ocean shipping) and marine insurance financed under the Loan shall have their source and origin in Bolivia and 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 A.I.D. Geographic Code 941.

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

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

(i) evidence that the lands to be transferred to settlers are subject to no easements or other uses of third parties which might unreasonably interfere with the settlers' use and enjoyment of the lands;

(ii) evidence of adequate staffing in the National Colonization Institute (INC); and

(iii) a plan for the promotion of colonization in the Project area.

(d) Prior to any disbursement or issuance of any commitment documents under the Loan for any purpose other than to finance consulting engineering, design, or technical assistance services, Borrower will submit to A.I.D., in form and substance satisfactory to A.I.D.:

(i) evidence of the creation of a coordinating mechanism that will include a revised Operations Committee and the appointment of a project coordinator for the INC;

(ii) agreements among those GOB ministries and agencies participating in the execution of the Project, setting forth their roles, responsibilities and contributions to the Project;

(iii) evidence of adequate provision for orientation of new settlers in the Project area;

(iv) a statement of the criteria settlers must meet in order to be eligible to receive title to their lands; and

(v) a time phased implementation plan for carrying out and monitoring the project and an evaluation plan for measuring progress toward meeting project goals and assessing the project outputs against planned output targets.

(e) Prior to the initiation of any construction activity Borrower shall submit, in form and substance satisfactory to A.I.D., complete plans and specifications for such construction.

2. Covenants

Except as AID may otherwise agree, the Borrower shall covenant:

(i) to effect necessary staffing changes and additions on a timely basis;

(ii) to review the progress of the Project annually with AID in accordance with a mutually agreed upon implementation plan;

(iii) to develop and execute a land use policy, within six months of the completion of the land use survey, which, among other things,

(a) acknowledges the findings of the land use survey,

(b) sets aside lands for future settlement projects, and

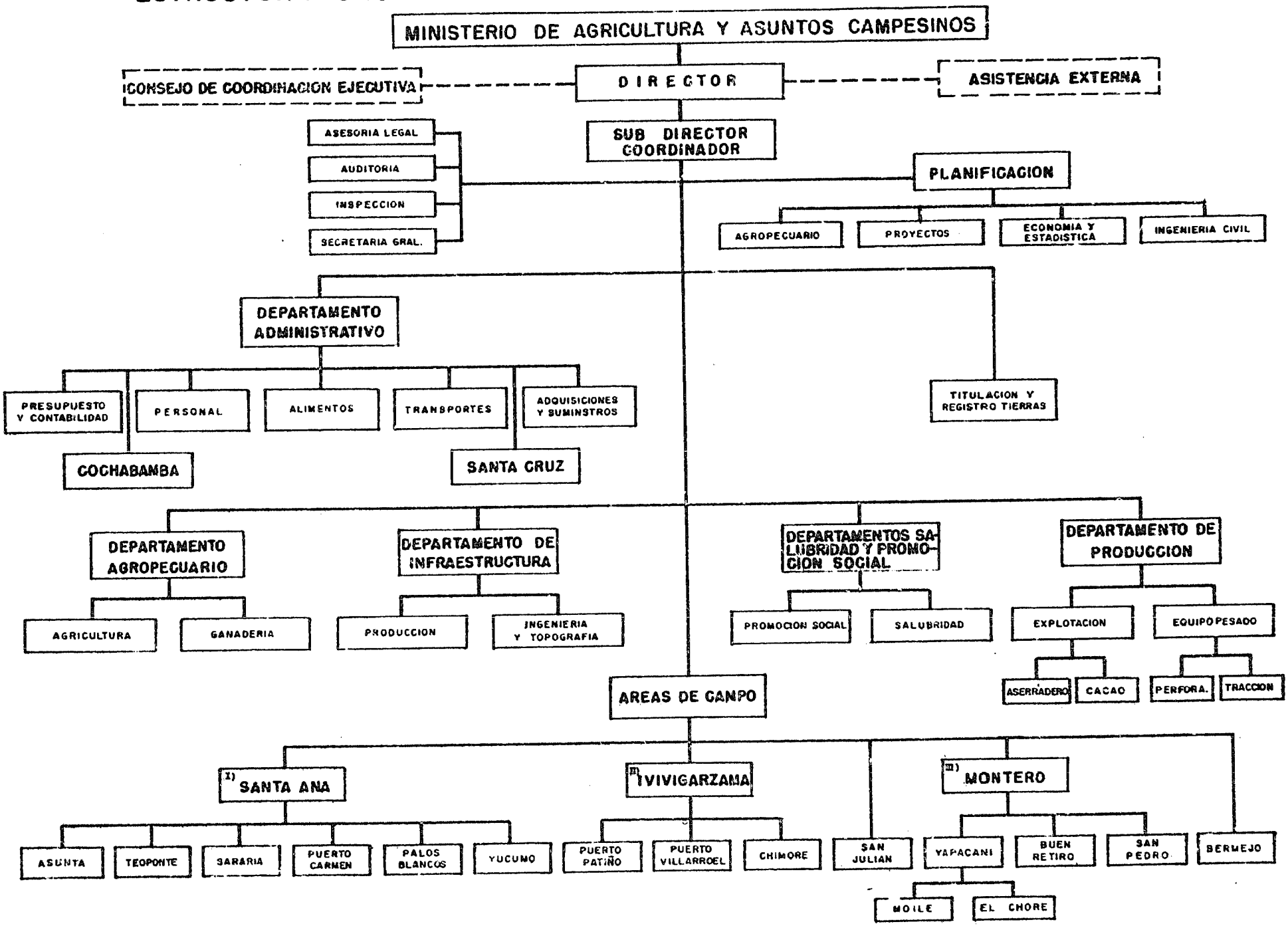
(c) outlines a framework for the development of those lands set aside;

(iv) to provide adequate support to the research and extension staff in the project area;

(v) to formalize a small farmer credit mechanism for the project area which involves the Bolivian Agricultural Bank, and the Agricultural Extension, Credit and Cooperative Development Agencies; and

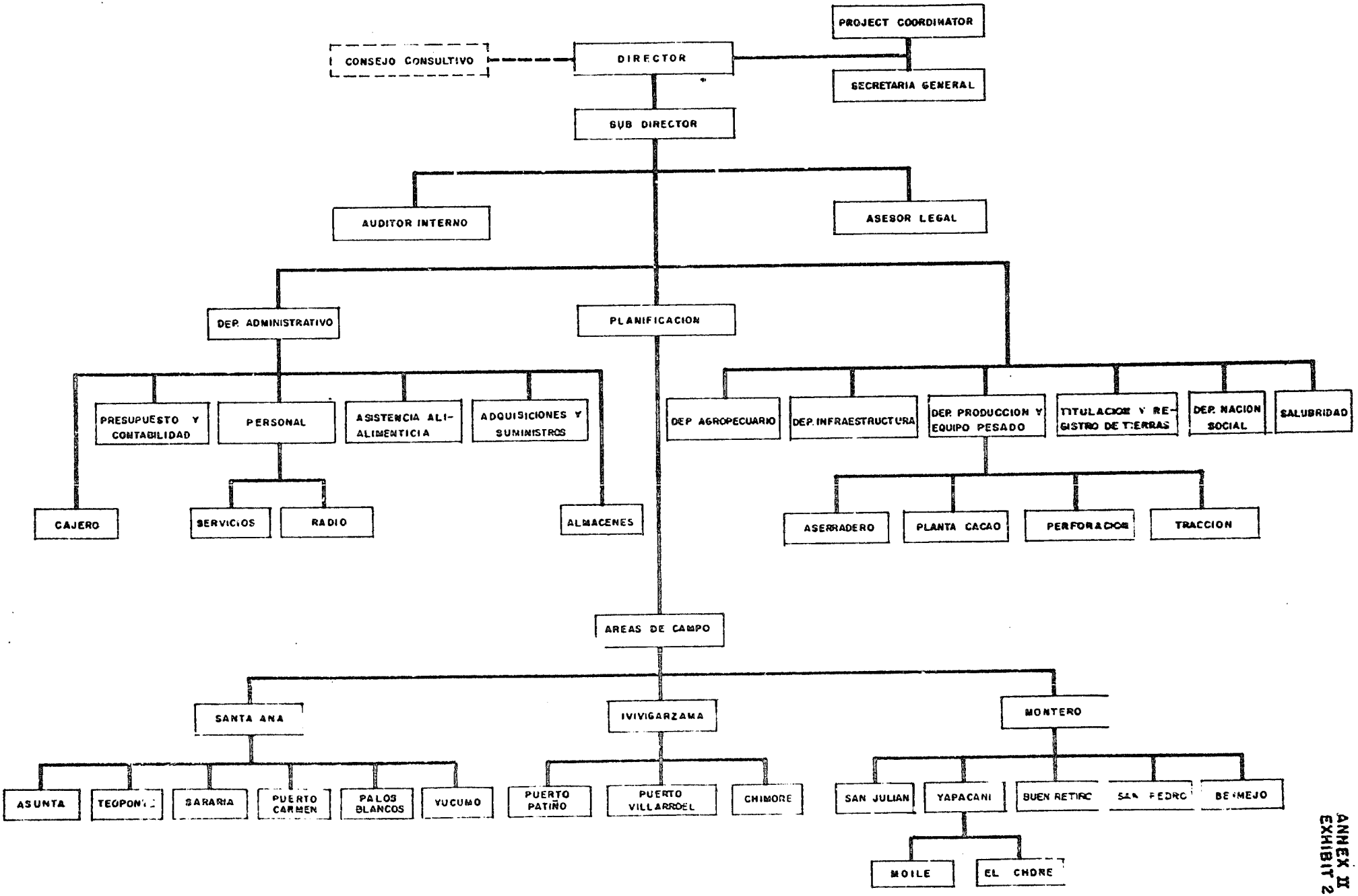
(vi) to limit the role of INC in GOB colonization efforts to those activities which are generally associated with pioneer colonization, while leaving the longer term, consolidation activities to other governmental agencies, thereby freeing INC to move on to other colonization projects.

ESTRUCTURA ORGANICA DEL INSTITUTO NACIONAL DE COLONIZACION



ANNEX II
EXIBIT 1

PROPOSED OF INC ORGANIZATION CHART



ANNEX II
EXHIBIT 2

ENGINEERING AND CONSTRUCTION ANALYSIS

TABLE OF CONTENTS

		Page
1.	Technical Description of Project	2-4
2.	Analysis of Project Costs	5-10
3.	Unit Cost Analysis	11-15
4.	Design Criteria	16
5.	Typical Sections	17-18
6.	Typical Buildings Layouts	19-23
7.	Location Map	24
8.	Typical Plot Layouts	25-27
9.	Bar Chart	28
10.	Criteria for Selection of Project Area	29-30
11.	Equipment Lists	31-32
12.	Preliminary Soils Investigation	33-40

DESCRIPTION OF THE PROJECT.

The physical parts of the project will consist of: the construction of 100 kilometers of Penetration Road in the San Julian area; the improvement and new construction of 80 kilometers of penetration road from Chané-Independencia to San Juan; the construction of two agriculture service center complexes, one in each of the two areas mentioned above; the construction of approximately 800 kilometers of dry weather access trails; construction of one sanitary post; and providing approximately 200 water points.

The Institute Nacional de Colonización (INC) will have the major coordinating responsibility for the overall project, but other agencies within the COB will have direct responsibilities for design, construction and maintenance of certain project components.

Penetration Roads.

Both penetration roads will be designed and constructed under the supervision of the Servicio Nacional de Caminos (SNC). The project will provide a full width roadbed (8 meters) constructed from local material (sideborrow) and a crushed aggregate all weather surfacing four meters wide in the San Julian area, which at this time is virgin timberland.

The Chané-Independencia area is presently colonized with some 6000 families but the existing road consists of a somewhat improved trail constructed by lumber companies about ten years ago. Due to the heavy rainfall in the area the majority of the road is closed to vehicular traffic 3 to 5 months of the year. The project will include the improvement of this road (80 km) to the same standards as those mentioned above for the road in the San Julian area.

Both roads will be designed for a minimum H10 (AASHO) loading capacity. As the areas are very flat (natural gradient varies between 1% - 2%) no design standards regulating curvature and grades are anticipated. No major rivers pass through the areas which would result in the construction of bridges. All drainage will be handled by locally manufactured reinforced concrete pipe or corrugated metal pipe.

SNC will contract personnel to supervise the design and will be responsible for the preparation of bid documents and selection of the contractor. They will also supervise and inspect the construction of the roads. A three year contract is anticipated at this time, of which 2-4 months each year will be unworkable due to heavy rains. Soil analyses indicate that the soils in the area are adequate to meet the required sub-base specifications in both sub-areas, and base specifications in the Chané sub-area, and supplies of crushed rock exist in plentiful amounts within reasonable distances from the road sites.

Dry Weather Access Trails.

The access trails will run perpendicular to the penetration road in the San Julian area, approximately 8 KM on each side. These trails will consist of a raised roadbed (approximately 20 cm) and side ditches with no surfacing and no or minimal drainage structures. It is anticipated that these trails will serve vehicular traffic only during the dry season, and the rest of the year will be open to 4 wheel drive vehicles and animal pulled carts. Other than the minimal width as shown on the typical section in this Annex, no specific design standards will be followed.

These trails will be constructed by force account by INC with the equipment indicated in the heavy equipment list included in this Annex. Rough road alignment will also be provided by INC, but no detailed plans will be prepared, nor will a fixed alignment and grade be followed.

Agriculture Service Centers.

Two agriculture service centers complexes will be built, one in the Chané-Independencia sub-area, and the other in the San Julian sub-area. In addition to the office space for agricultural extentionists, credit and research personnel, the complexes contain storage shop and repair facilities as well as housing for 15 families assigned to the centers.

Construction will be of the normal one story type, and use materials plentiful in the area. Construction will be done by contract, with plans prepared by the Ministry of Agriculture/INC. The contract will be administered by a Ministry of Agriculture agency. A water system, sewerage disposal system, and electric power source will be included in these centers.

Sanitary Post.

One sanitary post will be provied in the Agriculture Service Center in the San Julian area. This is a minimal facility with one bed, a consulting room, and living quarters for the resident nurse or sanitarian. The sanitary post will be constructed under the same contract for the Agriculture Service Center.

Water Points.

Approximately 200 water points will be provided in the San Julian area. These will consist of 8" wells between 50 and 75 meters of depth, a manual pump and a basin or tank to store water. Wells will be drilled by INC personnel with a rig obtained with loan funds. Casing will be imported, but pumps and other material will be procured locally.

Maintenance Equipment.

The Servicio Nacional de Caminos (SNC) will receive 2 loan financed motor graders for the purpose of maintaining the two penetration roads after the completion of construction.

PENETRATION ROAD (SAN JULIAN)

CAPITAL COST AND INVESTMENT

US$

I. AID LOAN

	Item	AID F/C	AID L/C	Local Contribution	TOTAL
A.	R/W Clearing	116,600	77,800		194,400
B.	Excavation	922,600	395,400		1,318,000
C.	Drainage		288,400		288,400
D.	Sub-Base	360,000	240,000		600,000
E.	Crushed Rock Surf.	230,500	922,200		1,152,700
	Sub-Total	1,629,700	1,923,800		3,553,500
F.	Contingency (10%)	163,000	192,400		355,400
G.	Engineering (6%)		234,500		234,500
	Sub-Total	1,792,700	2,350,700		4,143,400

II. LOCAL CONTRIBUTION

A.	Supervision (SNC)			80,000	80,000
	TOTALS	1,792,700	2,350,700	80,000	4,223,400

PENETRATION ROAD (CHANE-INDEPENDENCIA)

CAPITAL COST AND INVESTMENT

US$

I. AID LOAN

	Item	AID F/C	AID L/C	Local Contribution	TOTAL
A.	R/W Clearing	46,800	31,000		77,800
B.	Excavation	692,200	296,600		988,800
C.	Drainage	0	230,700		230,700
D.	Sub-base Material	57,000	229,000		286,000
E.	Crushed Rock Surf.	127,400	508,600		636,000
	Sub-Total	923,400	1,295,900		2,219,300
F.	Contingency (10%)	92,340	129,590		221,930
G.	Engineering (6%)		146,500		146,500
	Sub-Total	1,015,740	1,571,990		2,587,730

II. LOCAL CONTRIBUTION

A.	Supervision (SNC)			64,000	64,000
B.	Land			30,000	30,000
	Sub-Total			94,000	94,000
	TOTALS	1,015,740	1,571,990	94,000	2,681,730

DRY WEATHER ACCESS TRAILS

CAPITAL COST AND INVESTMENT

US$

I. AID LOAN

	Item	AID F/C	AID L/C	Local Contribution	TOTAL
A.	Equipment (Items 1 thru 10 on Equipment list)	764,000*			764,000
B.	Operating Costs				
	1) Lubricants, filters, etc.	32,000			32,000
	2) Repairs	310,000			310,000
	Sub-Total	1,106,000			1,106,000

II. LOCAL CONTRIBUTION

A.	Labor			60,000	60,000
B.	Materials			10,000	10,000
C.	Operating Costs				
	1) Fuel			131,000	131,000
	2) Repairs (Labor)			135,000	135,000
	3) Labor			132,000	132,000
	Sub-Total			468,000	468,000
	TOTAL COST	1,106,000		468,000	1,574,000

* All equipment is considered to be fully depreciated during life of project.

AGRICULTURE SERVICE CENTER

CAPITAL COST AND INVESTMENT

US$

I. AID LOAN

	Item	AID F/C	AID L/C	Local Contribution	TOTAL
A.	Service Center Bldg.		50,400		50,400
B.	Housing		76,500		76,500
C.	Garages		23,000		23,000
D.	Water Supply		5,000		5,000
E.	Sewerage		1,500		1,500
F.	Electrical Power	12,000			12,000
	Sub-Total				168,400
G.	Contingency (10%)		16,800		16,800
	Sub-Total	12,000	173,200		185,200

II. LOCAL CONTRIBUTION

A.	Design			15,000	15,000
B.	Supervision			10,000	10,000
C.	Site Preparation			2,000	2,000
	TOTAL	12,000	173,200	27,000	212,200

III. SUMMARY (2 Centers)

A.	Construction	24,000	346,000	54,000	424,000
B.	Vehicles	58,000			58,000
C.	Farm Tractors & Accessories	45,000			45,000
D.	Shop & Garage Equip. (San Julian)	40,000			40,000
E.	Office Equip.	12,000			12,000
	TOTALS	179,000	346,000	54,000	579,000

SANITARY POST

CAPITAL COST AND INVESTMENT

US$

Item	AID F/C	AID L/C	Local Contriburion	TOTAL
A. Construction (162 m2)		12,900		12,900
B. Supervision			2,000	2,000
C. Site Preparation			1,000	1,000
TOTALS:				
AID LOAN		12,900		
LOCAL CONTRI-BUTION			3,000	
PROJECT COST				16,900

WATER POINTS

CAPITAL COST AND INVESTMENT

US$

I. AID LOAN

	Item	AID F/C	AID L/C	Local Contribution	TOTAL
A.	Equipment	40,000			40,000
B.	Materials	135,000	95,000		230,000
C.	Operating Costs (Repair Portion)	7,200			7,200
	Sub-Totals	182,200	95,000		277,200

II. LOCAL CONTRIBUTION

A.	Supervision			1,000	1,000
B.	Operating Costs			15,800	15,800
C.	Labor			8,000	8,000
D.	Materials			23,500	23,500
	Sub-Totals			48,300	48,300
	TOTAL				325,500

CONSTRUCTION BASE COST PER KILOMETER (US$)

I. SAN JULIAN PENETRATION ROAD

Quantity	Unit	Item	Unit Cost	Extension
3.5	Hectares	Clear & Grub	555.43	1,944.00
6130	M3	Excavation	2.15	13,180.00
1	Unit	Drainage	-	2,884.00
440	M3	Aggregate sub-base	13.50	6,000.00
660	M3	Aggregate Surface	17.47	11,527.00
		Cost per Kilometer		35,535.00

II. CHANE-INDEPENDENCIA PENETRATION ROAD

1.75	Hectares	Clear & Grub	555.43	973.00
57.44	M3	Excavation	2.15	12,350.00
1	Unit	Drainage	-	2,884.00
440	M3	Aggregate Sub-base	8.12	3,572.00
660	M3	Aggregate Surface	12.05	7.955.00
		Cost per Kilometer		27,734.00

III. DRY WEATHER ACCESS TRAILS

A. Equipment	955.00
B. Operating Costs	912.50
C. Other	87.50
Cost per Kilometer	1,955.00

COST BREAKDOWN OF OPERATING COST OF EQUIPMENT FOR ACCESS TRAILS

US$

(Based on Formulae provided in Caterpillar Performance Handbook, Edition I).

Equipment	No. of Units	*Cost Per Hour	Hours of Operation	TOTAL
I. FUEL CONSUMPTION				
a) Small tractor	1	0.75	10,000	7,500
b) Medium tractor	6	0.94	54,000	50,800
c) Motor Grader	2	0.94	20,000	18,800
d) Trucks	6	1.50	36,000	54,000
Sub-Total				131,000
II. LUBRICANTS, FILTERS, ETC.				
a) Small Tractor	1	0.20	10,000	2,000
b) Medium Tractor	6	0.25	54,000	13,500
c) Motor Graders	2	0.25	20,000	5,000
d) Trucks	6	0.31	36,000	11,200
Sub-Total				32,000
III. REPAIRS				
a) Small Tractor	1	4.00	10,000	40,000
b) Medium Tractor	6	6.67	54,000	360,000
c) Motor Grader	2	1.50	20,000	30,000
d) Trucks	6	.42	36,000	15,000
Sub-Total				445,000

IV. OPERATORS.

Man Years of Work		45
Salary/Man Year	$	900
Social Benefits	$	630

Total Salary and Social Benefits	$ 68,850
Annual Salary Increased (TOTAL)	39,610
Food and Shelter	24,000
Sub-Total	132,000
TOTAL	740,000

*All Costs based on Estimated 1976-77 prices.

AGRICULTURE SERVICE CENTERS

PROJECT COST BREAKDOWN

US$

1.	SERVICE CENTER BLDG.			
	560 M2	at 90/m2	=	50,400
2.	HOUSING			
	A. Type A (Individual)			
	2 ea.	at 88 M2 at 80/M2	=	14,100
	13 ea.	at 60 M2 at 80/M2	=	62,400
		Sub-Total		76,500
3.	OUTBUILDINGS			
	A. Shop			
	1 ea.	at 80 M2 at 75/M2	=	6,000
	B. Storage			
	1 ea.	at 80 M2 at 75/M2	=	6,000
	C. Garage			
	1 ea.	at 22 M2 at 50/M2	=	11,000
		Sub-Total		23,000
4.	SEWERAGE			
	Septic Tank and Leaching Field			1,500
5.	WATER SUPPLY			
	Storage Tank and Pump			3,000
	Distribution			2,000
		Sub-Total		5,000
6.	POWER SUPPLY			
	2 ea. 40 KW Generators			12,000
		TOTAL		168,400

BASE COST PER WELL

	Item	Cost/Ft.	Cost/Well
1.	Equipment*	$ 1,33	$ 200
2.	Casing	4,00	600
3.	Expendible Materials		
	a) Local	0.50	75
	b) Imported	0.50	75
4.	Operating Costs	0.77	115
5.	Supervision, Labor, Materials	0.42	62.50
	Sub-Total	7.52	$ 1,127.50
6.	Pump		350
7.	Storage Tank		150
	Total Cost Per Well		$ 1,627.50

*Well drilling rig entire cost pro-rated per well.

DESIGN CRITERIA.

The penetration roads will be designed for a H10 (AASHO) loading, with a 8 meter roadbed and 4 meters of aggregate surfacing to provide all weather access. As the area is extremely flat, no specific design criteria will be followed for horizontal and vertical alignment. No major drainage structures will be constructed.

The access trails will have no fixed design standards other than the width (4 meters) and side drainage ditches.

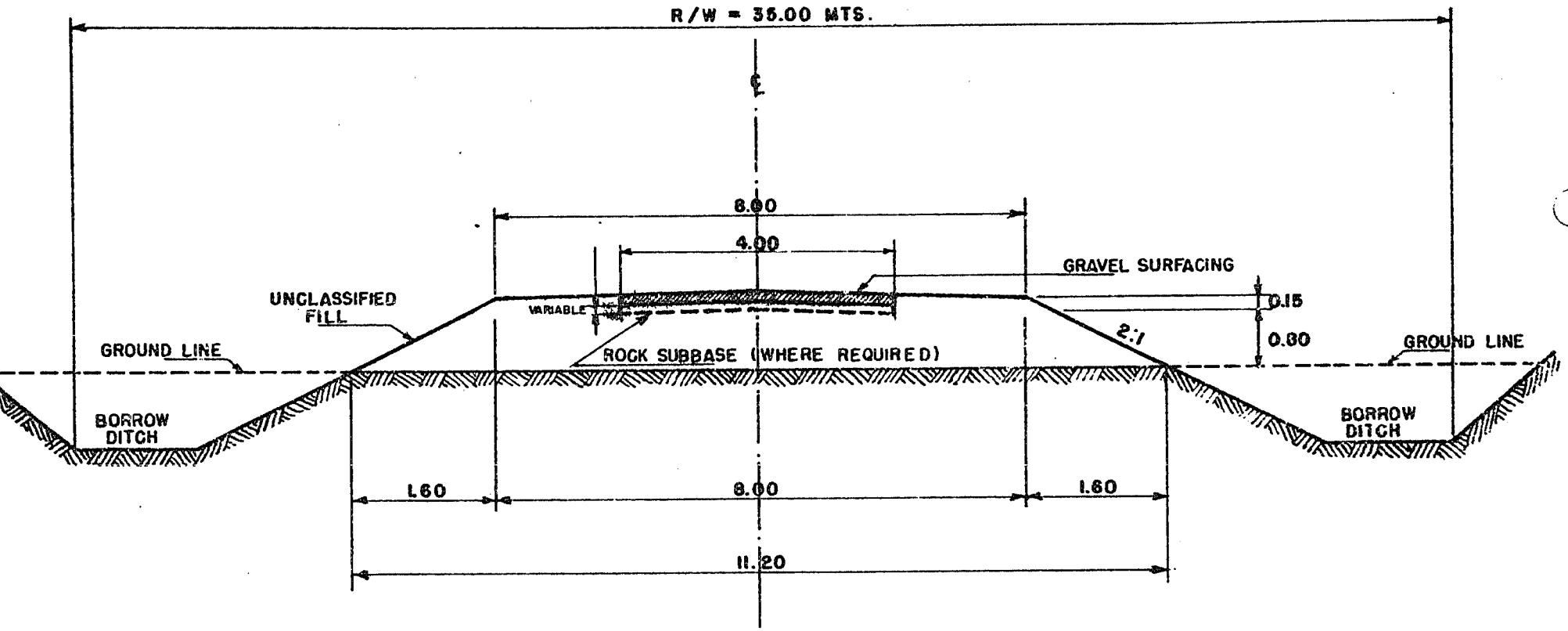
Local standards will be followed in the design of the buildings included in the project.

I. Penetration Roads.

1.	Roadway width	8 meters
2.	Rock Surface Width	4 meters
3.	Surface Thickness	15 cm.
4.	Base Thickness	10 cm.
5.	Capacity	H10 (AASHO)
6.	Fill Slopes	2:1
7.	Grades	Natural Slope
8.	Culverts	RCP or CMP

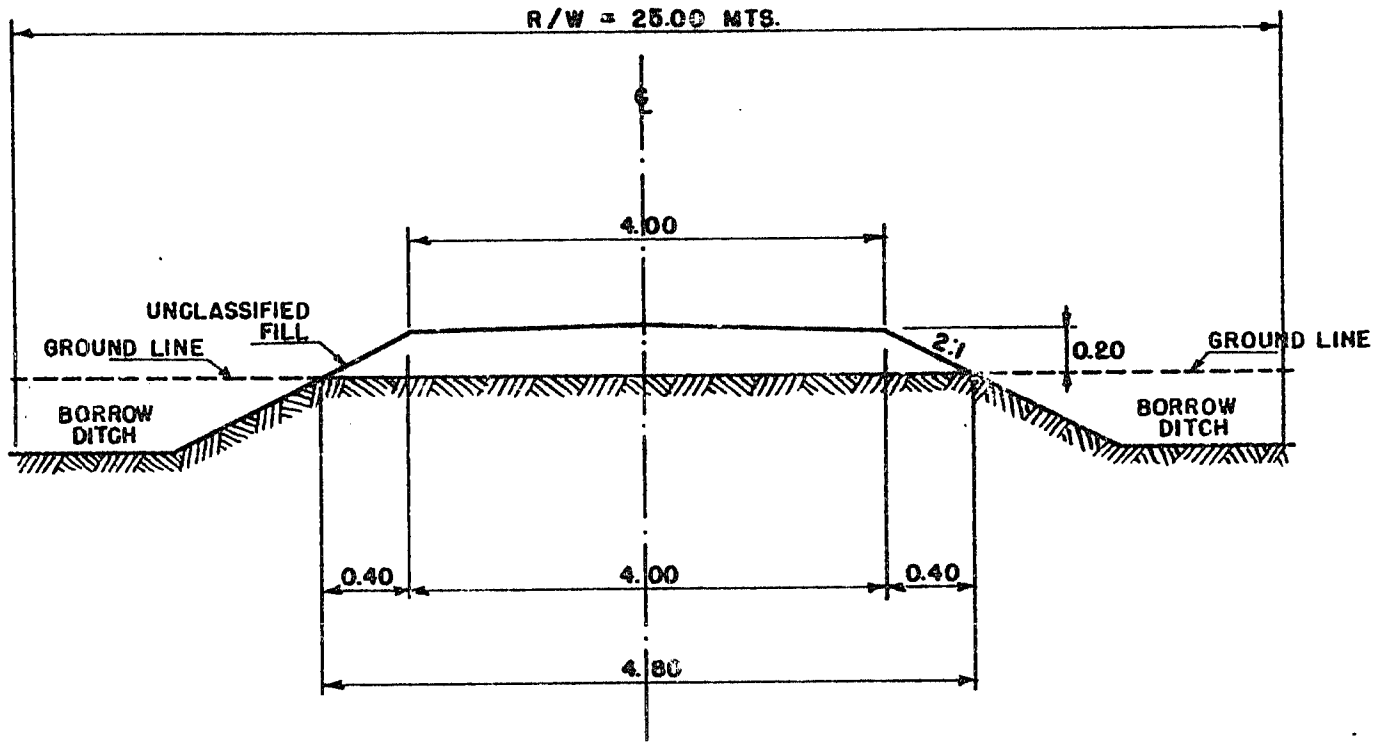
II. Access Trails:

1.	Roadway Width	4 meters
2.	Surfacing	None
3.	Capacity	None Designed
4.	Fill Slopes	2:1
5.	Grades	Natural Slope
6.	Culverts	None



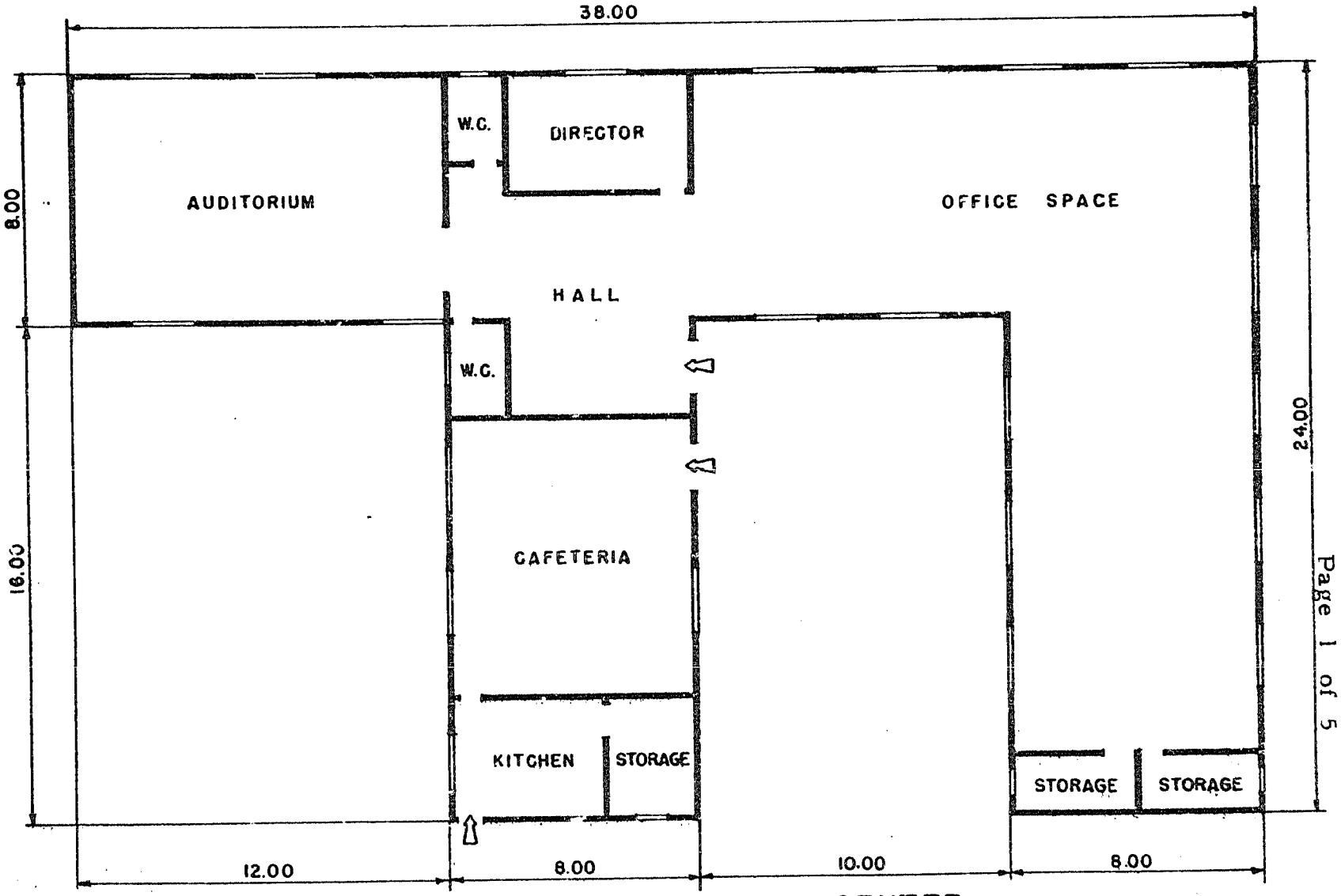
NOT TO SCALE

TYPICAL CROSS SECTION FOR PENETRATION ROADS



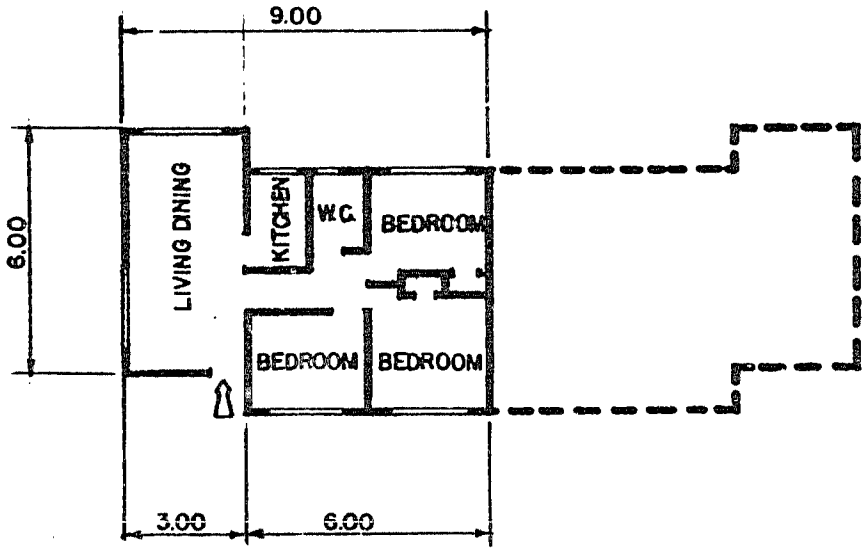
NOT TO SCALE

TYPICAL CROSS SECTION FOR DRY WEATHER ACCESS TRAILS



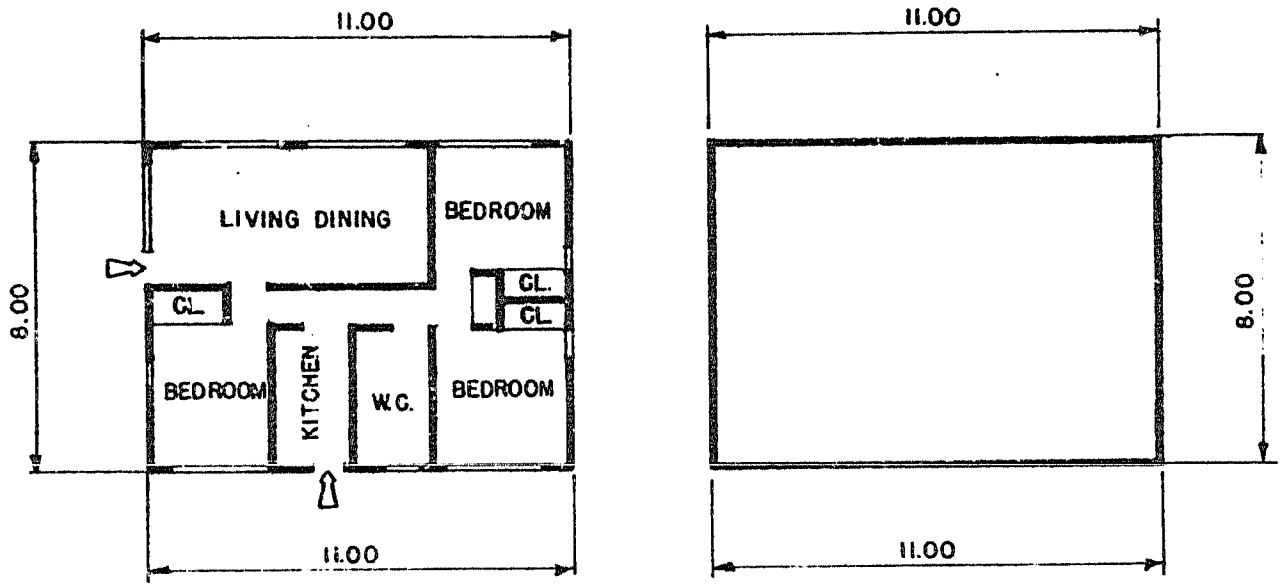
AGRICULTURAL SERVICE CENTER

Offices



AGRICULTURAL SERVICE CENTER

Houses for Personnel



AGRICULTURAL SERVICE CENTER

Houses for Directors

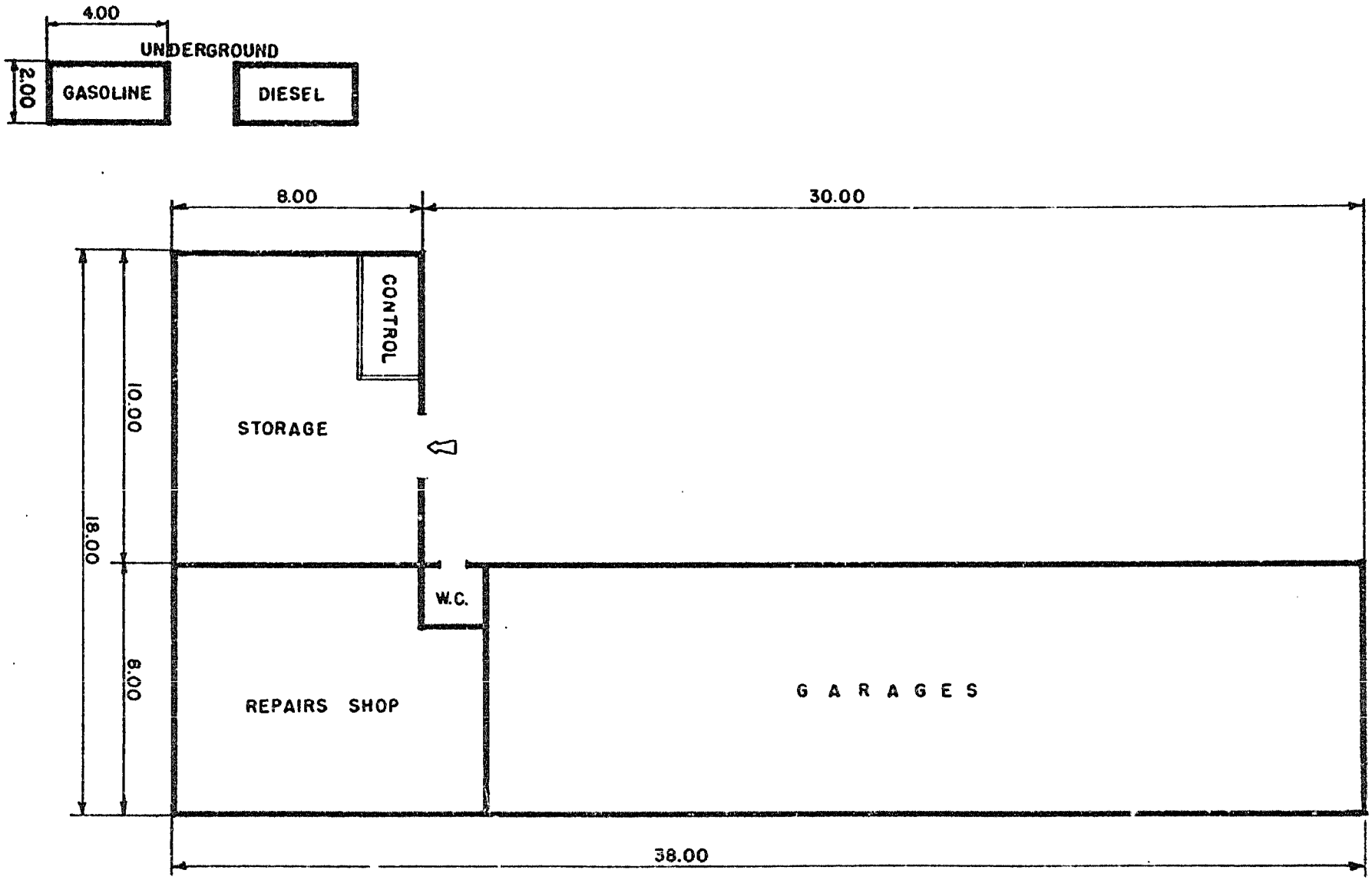
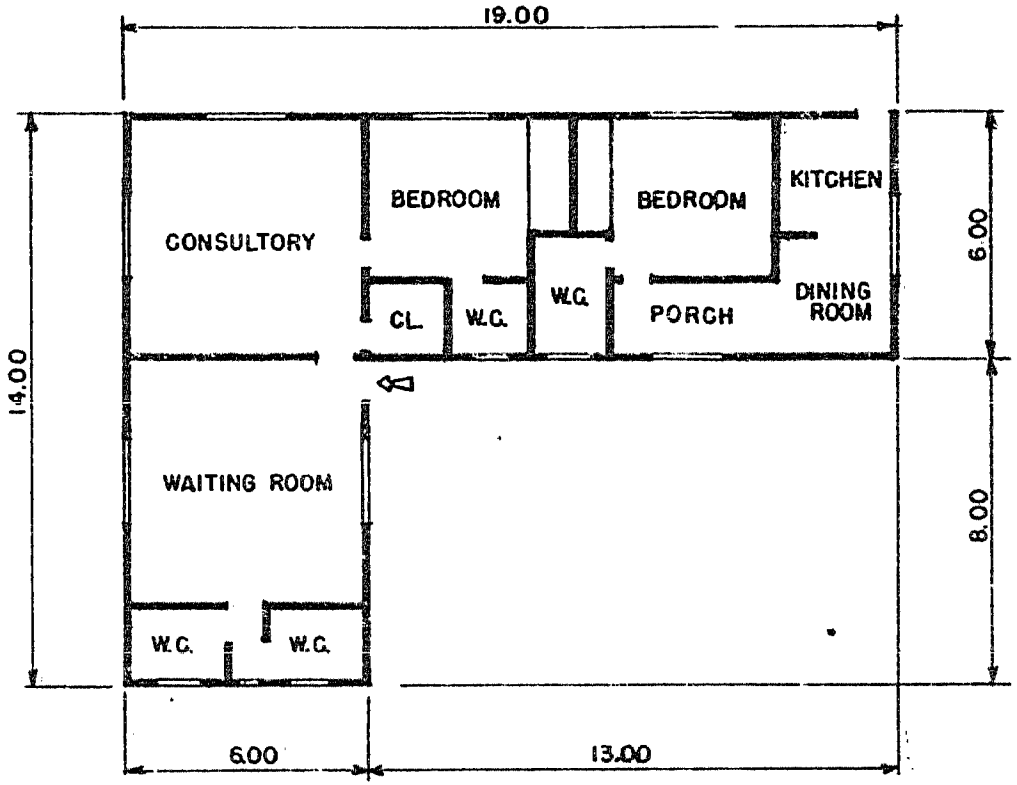


EXHIBIT 6 - Page 4 of 5

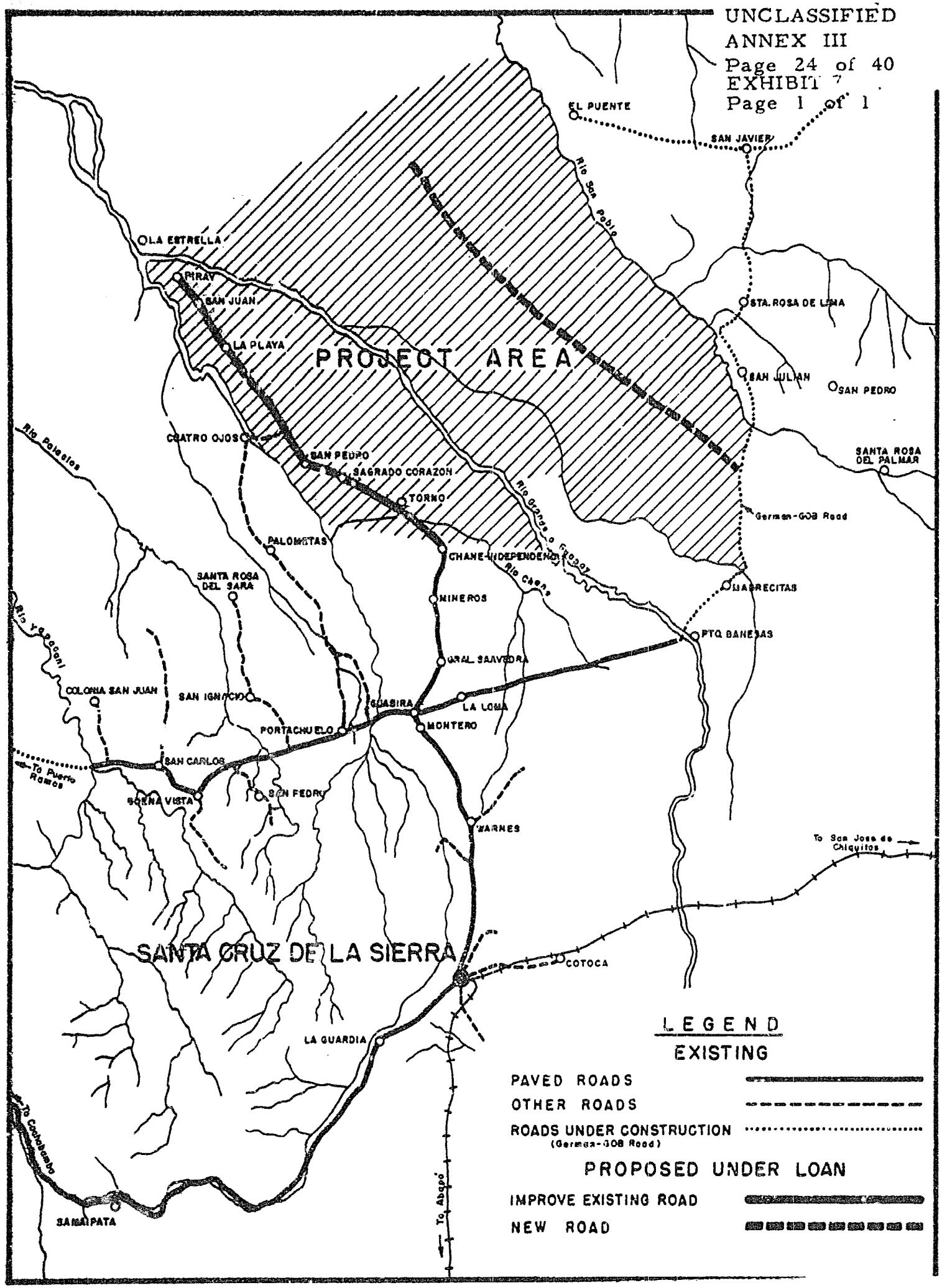
AGRICULTURAL SERVICE CENTER

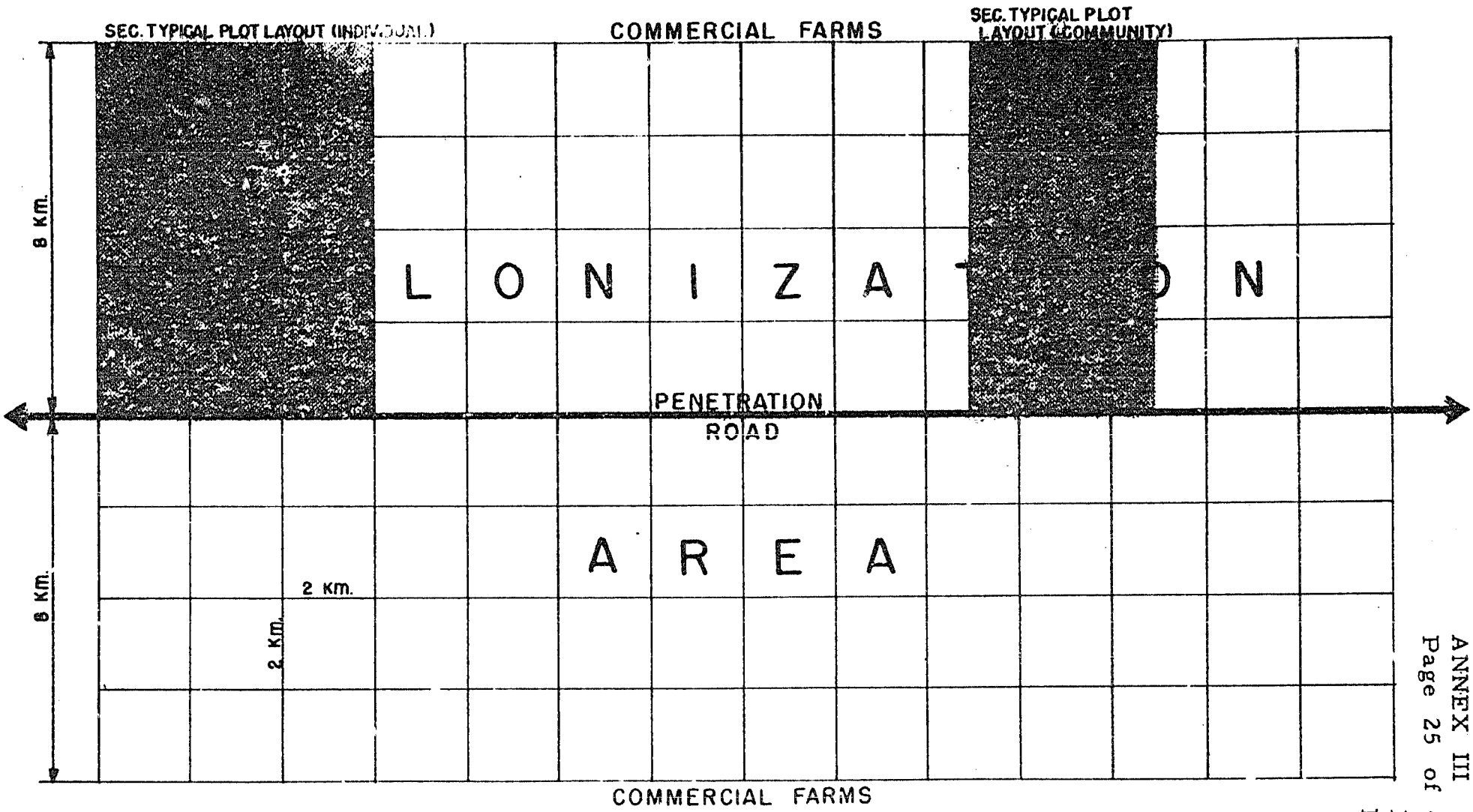
Shops and Garages



AGRICULTURAL SERVICE CENTER

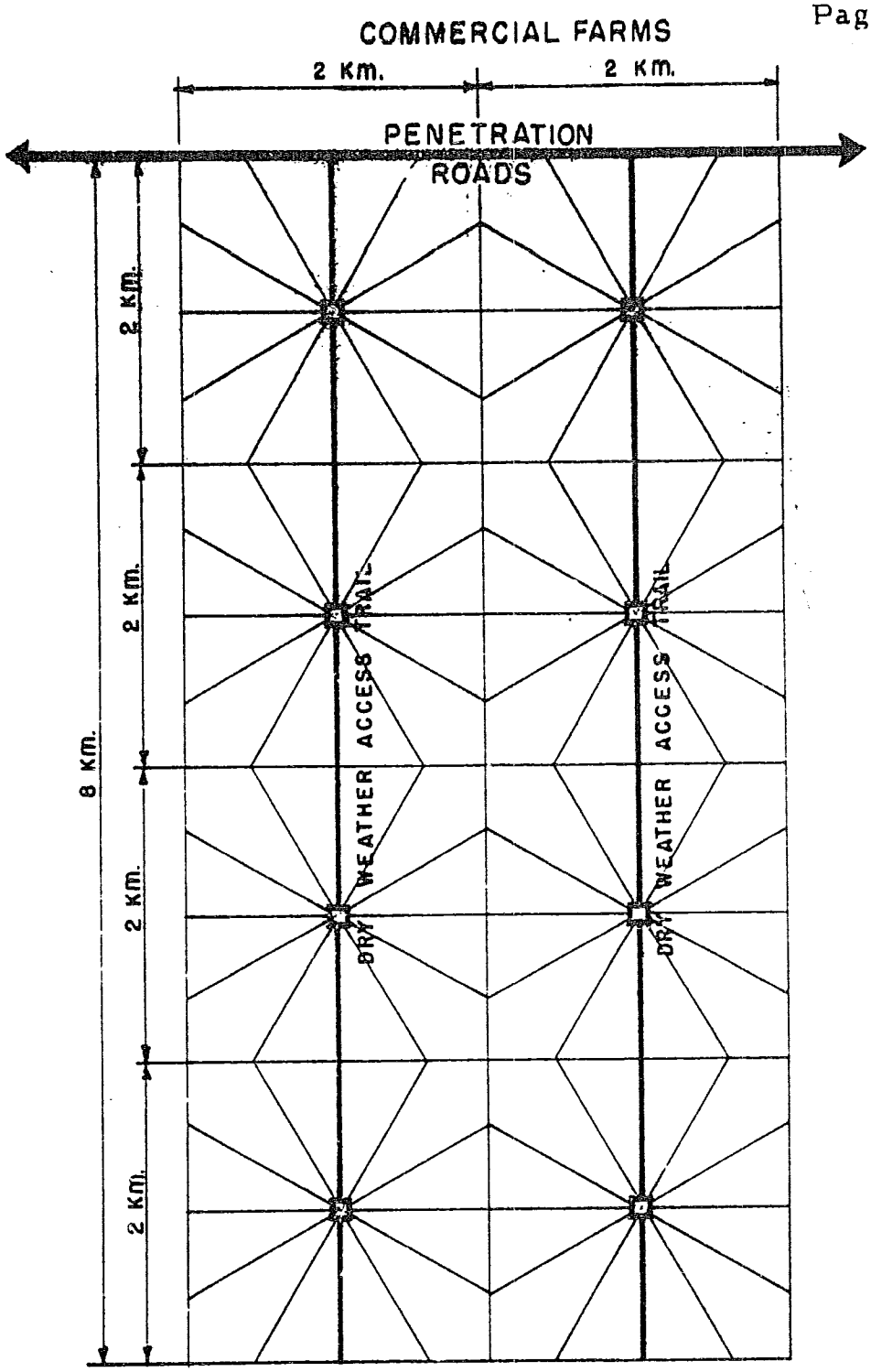
Sanitary Post


PROJECT AREA
SANTA CRUZ DE LA SIERRA
EL PUENTE
SAN JAVIER
Rio San Pablo
LA ESTRELLA
PIRAY
SAN JUAN
LA PLAYA
STA. ROSA DE LIMA
SAN JULIAN
SAN PEDRO
SANTA ROSA DEL PALMAR
Rio Palacios
CUATRO OJOS
SAN PEDRO
SAGRADO CORAZON
TORNO
Rio Grande
German-GOB Road
PALOMETAS
CHANE-INDEPENDENCIA
Rio Chane
SANTA ROSA DEL SARA
MINEROS
MAGRECITAS
PTO BANEGAS
Rio Yapacani
GRAL SAAVEDRA
COLONIA SAN JUAN
SAN IGNACIO
GUASIRA
LA LOMA
PORTACHUELO
MONTERO
SAN CARLOS
To Puerto Ramos
BUENA VISTA
SAN PEDRO
WARNES
To San Jose de Chiquitos
COTOCA
LA GUARDIA
To Cochabamba
SAMAIPATA
To Abapó
LEGEND
EXISTING
PAVED ROADS
OTHER ROADS
ROADS UNDER CONSTRUCTION
(German-GOB Road)
PROPOSED UNDER LOAN
IMPROVE EXISTING ROAD
NEW ROAD



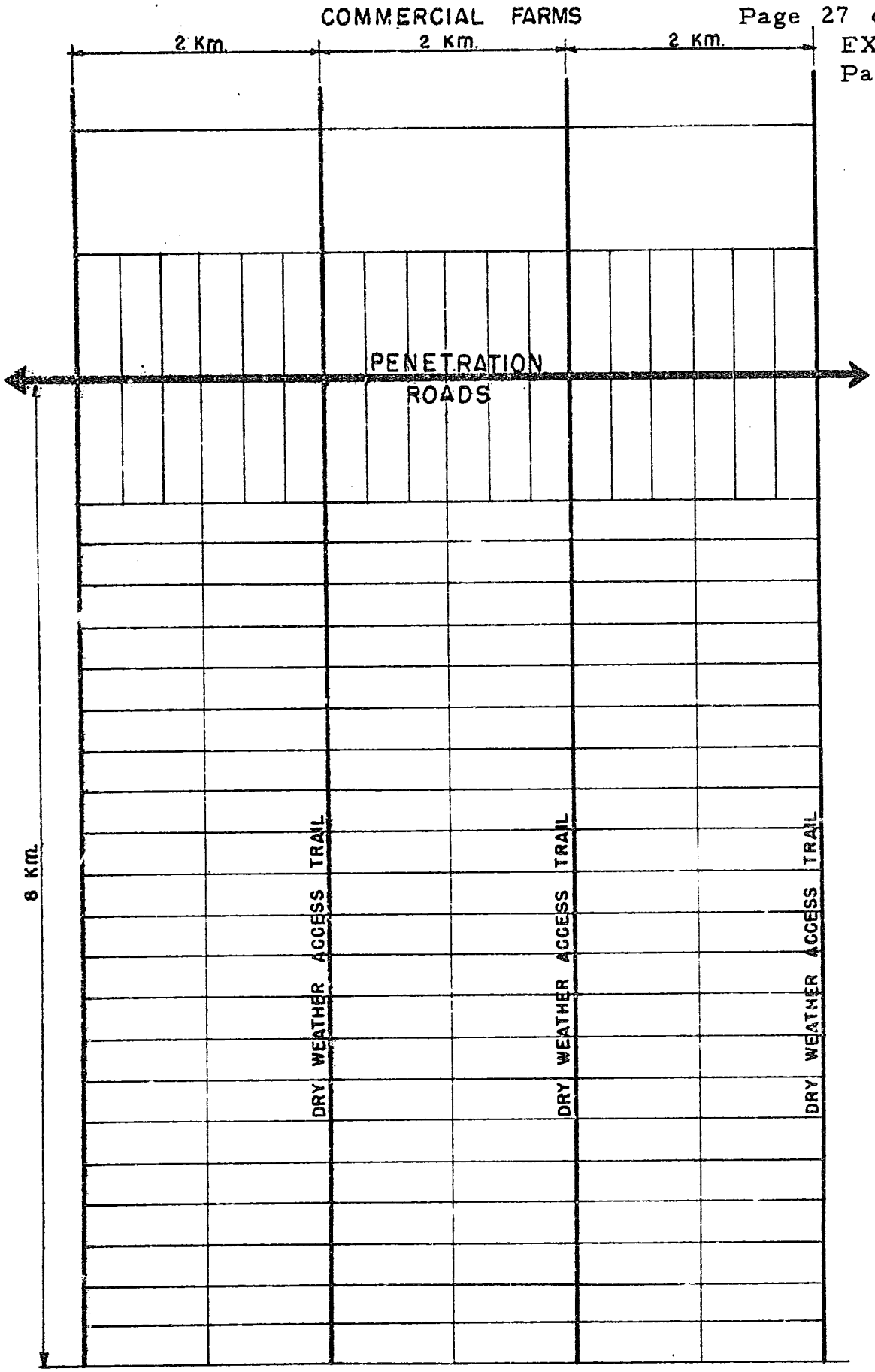
TYPICAL PLOT LAYOUT (QUADRATIC PATTERN)

San Julian Sub Area



TYPICAL PLOT LAYOUT (COMMUNITY)

PLOT SIZE 33 Hres



TYPICAL PLOT LAYOUT (INDIVIDUAL)

PLOT SIZE $330^M \times 1000^M$ (33 Hres)

ENGINEERING AND CONSTRUCTION SCHEDULE

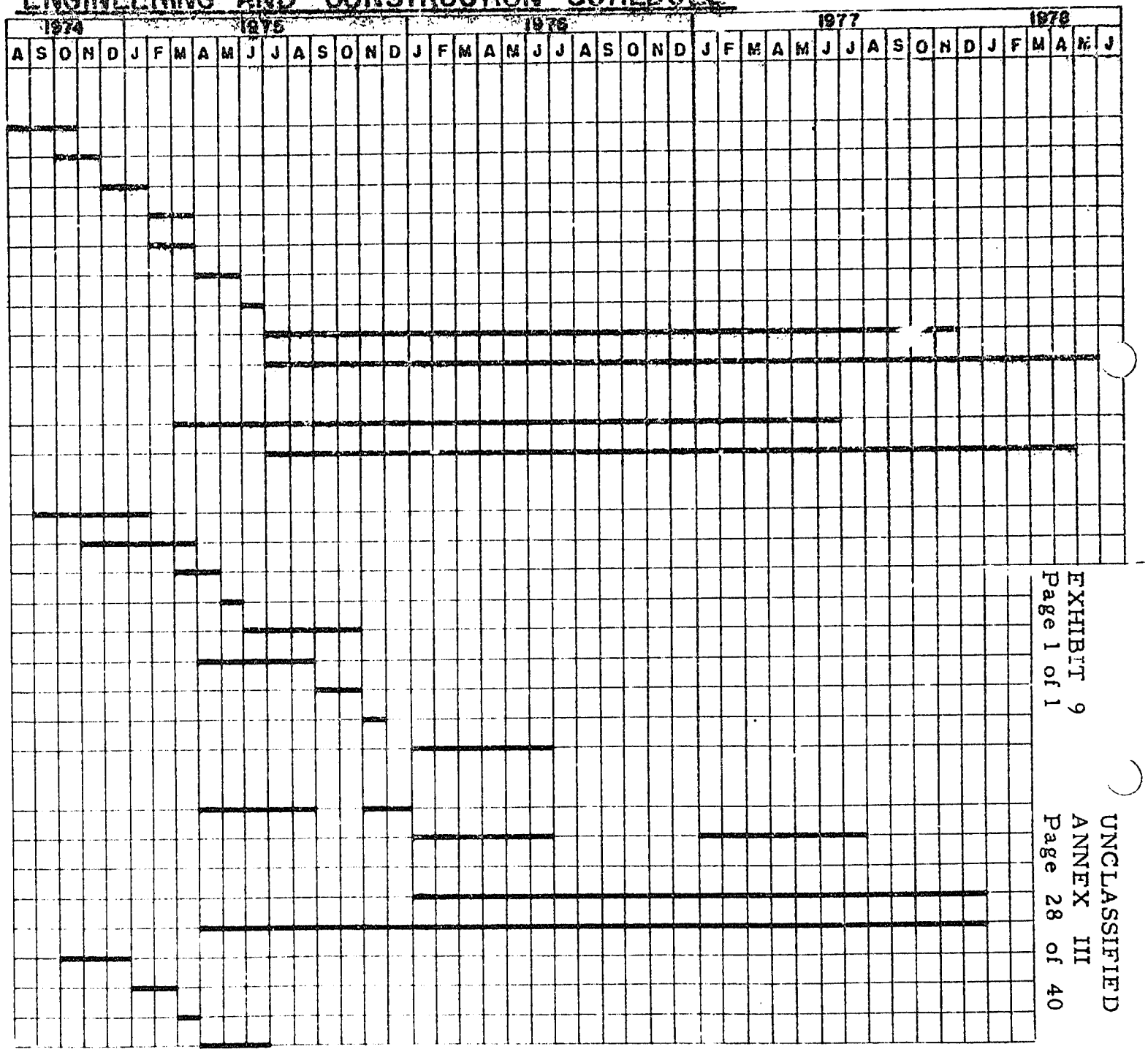


EXHIBIT 9
Page 1 of 1

UNCLASSIFIED
ANNEX III
Page 28 of 40

CRITERIA FOR SELECTION OF PROJECT AREA.

The following criteria were used to select the general area from a number of possible sites representing several sub-regions of the Oriente where the GOB has plans for sub-tropical lands development:

1. Capacity of the area (Climate, rainfall, soils,etc.) to produce commercial crops and livestock products which are in domestic short supply and/or which have export potential, as well as crops for subsistence until the farms become fully commercialized. Such crops and products include rice, corn, oilseeds, sugar, pork, cattle, chickens, wheat and forages for commerce and subsistence, as well as yuca and vegetables for subsistence.

2. The extent and distribution of the area in Class I and II soils and the current status of the land with respect to ownership. Land located in proximity to commercial land (large plots) is preferable to isolated regions for several reasons: (a) source of employment for "colonos", (b) source of labor for commercial agriculture removing limiting labor shortages; (c) access to product markets; and (d) access to more advanced techniques.

3. Existence of social and productive infrastructure. To the extent infrastructure is already in place, fewer additional resources will be required. The following kinds of infrastructure need be considered; (a) social infrastructure including health services, potable water, education, education, etc. (b) production service including research, extension, credit and availability of more moder factors of production; and (c) marketing services including transportation, milk and processing plants, storage, credit, etcetera.

4. Proximity to proposed AID-financed development center for the Central Oriente region referred to in DAP. Such a center would provide a series of services including, research, extension, credit, sale of modern factors of production, information of prices, and possibly purchase and storage of products. A part of the focus of this proposed regional center is a strong supportive role to

the GOB's sub-tropical land development effort.

5. Consideration of the social-cultural barriers to migration and selection of sites where Altiplano-Valley residents would have the lowest resistence to migrating.

6. Lack of other donor or GOB activity in the area.

7. Evidence of economic viability through "successful" spontaneous colonization.

HEAVY EQUIPMENT LIST

	ITEM	*COST
1.	1 Small tractor w/dozer (60-70 HP)	$ 35,000
2.	6 Med. tractors w/dozer (100-120 HP)	380,000
3.	4 Motor Graders	190,000
4.	1 Lube/Shop Truck	40,000
5.	2 Water Trucks	40,000
6.	1 2 1/2T Flat Bed Truck	8,000
7.	2 Dump Trucks	50,000
8.	1 Tilt Top Trailer	6,000
9.	2 Sheeps Foot Rollers (Single drum towed)	15,000
10.	Misc. Road Constr. Equip.	5,000
11.	1 Truck Mounted Well Drilling Rig	35,000
	TOTAL	$804,000

Items 1 through 11 for construction of Access Trails with exception of 2 motor graders which will be used by SNC for maintenance of the penetration roads.

Light Equipment

1.	12 Pickup Truck w/4 wheel drive	54,000
2.	8 Motorcycles (100-125cc)	4,000
3.	2 Farm Tractors	24,000
4.	Misc. Farm Tractor Attachments	21,000
5.	1 Mobile Health Van	10,000
	TOTAL	113,000

*CIF La Paz Estimated Costs July 1975.

EQUIPMENT FOR REPAIR & MACHINE SHOP
AGRICULTURE SERVICE CENTER

A. Major Equipment

1.	Lathe w/accessories	(1 ea.)	6,000. -
2.	Bench drill w/accessories	(2 ea.)	6,600. -
3.	Valve grinder w/accessories	(1 ea.)	720. -
4.	Valve seat w/accessories	(1 ea.)	650. -
5.	Electric saws		1,390. -
6.	Hydraulic press	(1 ea.)	680. -
7.	Electric grinder	(2 ea.)	1,360. -
8.	Electric welder	(1 ea.)	700. -
9.	Compressor	(1 ea.)	1,050. -
10.	Gas welder	(1 ea.)	1,100. -
11.	Forge	(1 ea.)	900. -
12.	Jacks	(2 ea.)	1,500. -
			$ 22,650. -

B. Minor equipment and tools $ 17,350. -

TOTAL $ 40,000. -

PRUDENCIO, CLAROS Y ASOCIADOS
INGENIEROS

La Paz, May 13, 1974

RECEIVED 14 MAY 1974 LA PAZ

United States Agency for International Development
c/o U.S. Embassy
La Paz, Bolivia

Atn: Mr. R. Dudley

Ref: Soils Investigation: Chané-Independencia to Piray and Ñuflo de Chavez Province, Department of Santa Cruz, Bolivia

Dear Sirs:

We are pleased to submit the following letter report summarizing the soils investigations on the above mentioned project.

In accordance with the terms of reference contained in Article I - Services to be performed - as outlined in Contract N° AID-511-78 between the United States Agency for International Development and Prudencio, Claros y Asociados the Consultant was required to:

A. Determine the type of soils along the following routes:

Area 1 - Chané-Independencia to Piray - Beginning in Chané-Independencia (Santiesteban Province) and following the existing road in a northwesterly direction to the town of Piray, a distance of 30 kilometers more or less. The Consultant shall obtain representative soil samples at points outside the existing road every 10 kilometers and at those areas deemed necessary or convenient due to an obvious change in the type of soil. The maximum number of samples obtained shall not exceed 15.

Area 2 - Ñuflo de Chavez Province - Beginning at an intermediate point between Puerto Banegas and the San Julian River alongside the projected road to the town of San Julian and following a general northeasterly direction. The Consultant shall obtain representative soil samples every 3 kilometers. The maximum number of samples shall not exceed 5. The investigation shall be performed as far as the road and terrain make it feasible. However, a minimum number of 2 samples will be obtained in this area.

B. For each soil sample, the Consultant shall perform the following tests:

1. California Bearing Ratio (C.B.R.)
2. Grain size analysis (sieve analysis)

3. Density "insitu" to determine swelling.

4. Atterberg limits (liquid limit, plastic limit, plasticity index).

5. Determine the classification of soils according to AASHO.

C. The Consultant shall also effect a tentative design of a cross section for an access road with recommended slopes for an H-10 AASHO Design Load.

The following discussion outlines the results of this investigation.

Site Investigation

Three field reconnaissance and soil sampling trips were made during the week of April 22, 1974; to evaluate soils conditions in the two study areas. The first trip was by 4-wheel drive vehicle from Chendo-Independencia to Piray (Area 1), a distance of 97.8 kilometers. The second, an aerial reconnaissance by light aircraft, provided an overview of both study areas. The third trip was by vehicle and horseback from Puerto Banegas in a northeasterly direction approximately 20 kilometers (Area 2). During these trips detailed notes were made of the terrain and representative soil samples collected for examination in our La Paz Soils Laboratory. The total number of samples obtained in this manner was eleven, 8 from Area 1, and the remaining three from Area 2. Unfortunately, no insitu density measurements were taken due to intense rainfall during the field investigation.

The locations of the spot check soil samples are shown on Figure 1.

The existing road is in very poor condition, consisting primarily of a "trail" constructed by clearing the natural vegetation and utilizing side borrow where necessary. There is no evidence of a constructed sub-base or base course. Drainage is of major importance and is non-existant at the present time. The area was not inundated at the time of the site visit, however rainfall had accumulated in low-lying areas, especially along the existing road.

Engineering Characteristics of Soils

The engineering characteristics of the soils encountered are primarily related to their suitability as highway subgrade and secondarily to their use as borrow for sub-base or base course materials.

Classification Tests

The results of classification tests for eleven samples are presented in Table 1.

All of the samples tested with the exception of sample N° 6 may be classified as AASHO Group A-4. The typical material of this group is a moderately plastic silty soil having 75% or more passing a No. 200 sieve.

BEST AVAILABLE COPY

Sample N° 6, AASHO Group A-7-6 (12), is a highly plastic clay soil which may be subject to high volume changes.

Compaction, CBR Tests

Six typical samples of the soils encountered were selected for more detailed testing. Compaction characteristics and CBR values for these samples are summarized in Table 1. None of the soils tested have significant swelling characteristics.

Natural Water Content

The in-situ water content is most important since it controls the strength characteristics of the soil and defines its practicable use as borrow material.

It may be noted that samples 1, 4, 1A, 2A and 3A have in-situ water contents generally at or below the Standard Proctor optimum water content for compaction. In contrast, samples 2, 3, 5, 6, 7 and 8 have in-situ water contents in excess of optimum, which makes hadling and compaction of these soils extremely difficult if not impracticable.

3. Pavement Design, Embankments

Design Load

M-10-44 of the AASHO Specifications. This loading simulates trucks having a gross weight of some 10 tons carried on two axles a design wheel load of 8,000 lbs.

Method of Design

The design of the flexible pavement has been based on the California Bearing Ratio (CBR) Method of Design.

To obtain CBR values, Laboratory CBR Testing (ASTM D 1883-67) was carried out on six subgrade soil samples. The samples were compacted in 6 in diameter moulds to Standard Proctor optimum density level at optimum moisture content, and tested in a hand operated CBR apparatus both in the AS-compacted (unsoaked) condition and after soaking in water for 4 days to simulate soaking of the subgrade in the field. The samples were tested under a 0.4 lb/in2 subcharge. The results of the testing together with the index properties of the soils tested are presented in Table 1.

Recommended Pavement Section

The total thickness of pavement required on top of a subgrade having the above minimum CBR [illegible] was determined from the empirical design charts of the California State Highway Department and compared with

BEST AVAILABLE COPY

the thickness required by several other agencies. These are given in the table below, together with the recommended thicknessess of base course, subbase and select borrow material.

C.B.R. %	Total Pavement Thickness, in.	Base Course Thickness, in.	Subbase Thickness, in.	Select Borrow Thickness, in.
2	24	6	8	10
3	20	6	8	6
4	17	6	8	3
5	15	6	8	1
5-10	14	6	8	0
10-18	12	6	6	0
18-25	10	6	4	0
25-30	8	6	2	0

Thus the base and subbase will be a constant thickness with up to 10 inches of select borrow material being placed below the subbase where the subgrade has a CBR of less than 5%.

Since no shoulders are to be incorporated in the road cross-sections, the base, subbase, and, if present, the select borrow material should extend out to the edge of the pavement to assist drainage of the section and also to minimize erosion at the pavement edges.

The recommended pavement section is shown on Figure 2. It is assumed that good construction techniques and control will be exercised in the field during construction, particularly with respect to the utilization of suitable construction materials for the pavement and their adequate compaction at moisture contents close to optimum.

Subgrade

All subgrades should be scarified, organic material and debris removed and compacted over a thickness of at least 12 inches to 100 percent of Standard Proctor density. Compaction should be carried out at optimum water content. In areas where the in-situ water content is higher than optimum, it is recommended that the road be placed on embankment fill of select borrow material. Where the terrain is subject of inundation, the road surface should be at least 3 feet above the inundation water level. If this is done, the "soaked" subgrade condition need not apply and the total pavement thickness reduced accordingly.

BEST AVAILABLE COPY

Subbase Course

Using a design wheel load of 8,000 lb, the surface and base courses require a subbase support equivalent to a CBR value of 25 percent or greater. To insure this criterion is met, subbase of select borrow compacted to 100 percent Standard Proctor density is essential.

PRUDENCIO, CLAROS Y ASOCIADOS
INGENIEROS

//..3

Base Course

The base course should be of crushed stone, rock or processed select granular material, compacted to 100 percent Standard Proctor Density such that the CBR is at least 80 percent.

Embankments

Embankments and fills should be of select borrow material. The fill should be compacted to 95 percent Proctor Density and the upper 12 inches compacted to 100 percent Standard Proctor Density. Provided the CBR of this upper 12 inches is not less than 25 percent, then the subbase may be eliminated. Side slopes of fills should not be steeper than 2:1, horizontal to vertical.

Yours very truly,

PRUDENCIO, CLAROS Y ASOCIADOS
INGENIEROS

William R. Turner, P. Eng.

WRT : clp.

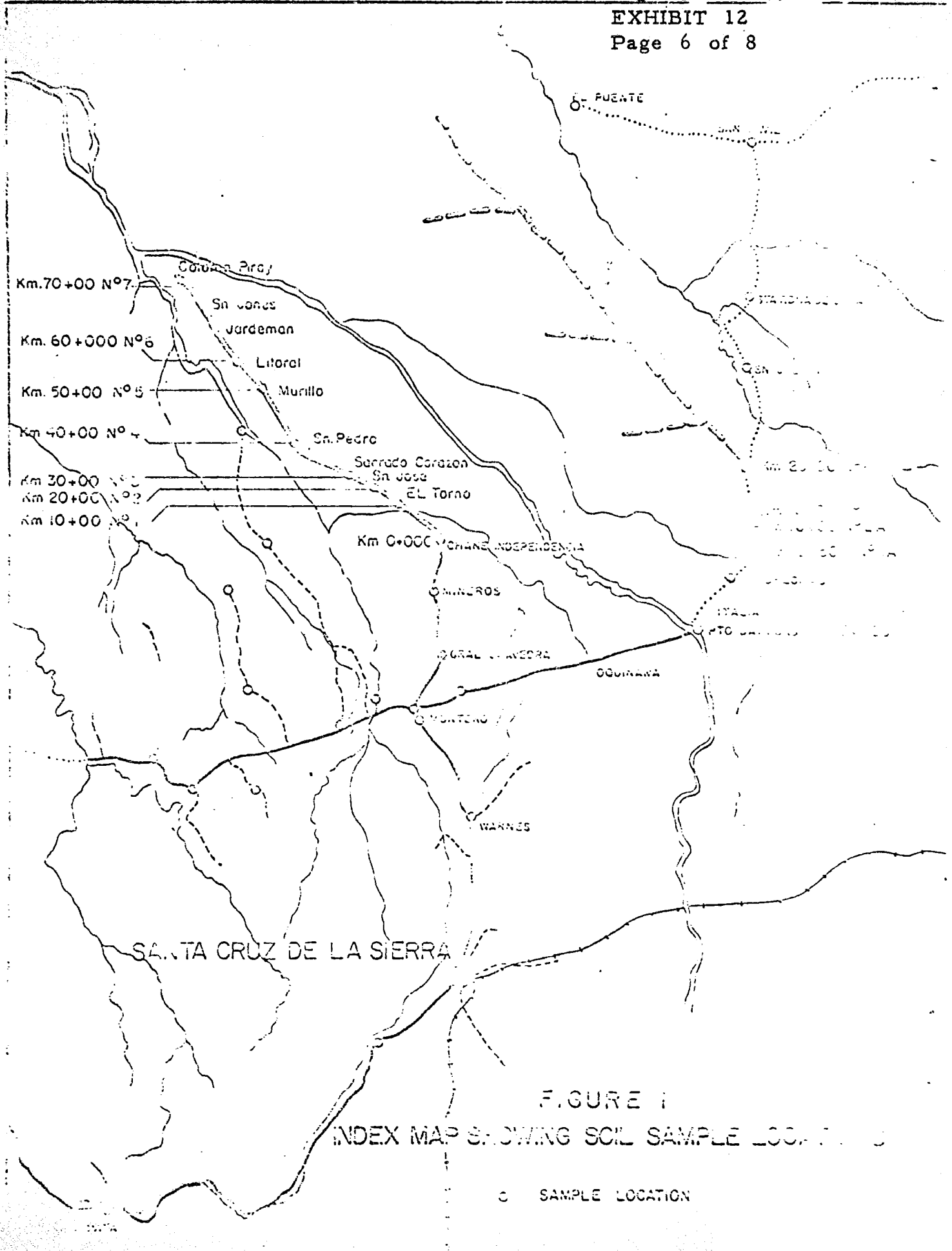
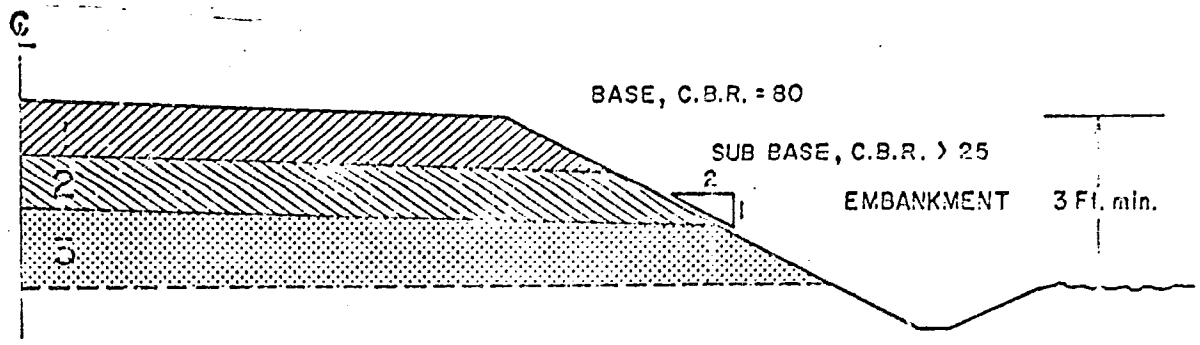


FIGURE 1
INDEX MAP SHOWING SOIL SAMPLE LOCATIONS

○ SAMPLE LOCATION

PRUDENCIO, CLAROS Y ASOCIADOS
INGENIEROS



PAVEMENT SECTION

1. Base Course - To have a minimum CBR of 80%, materials used will crushed stone or select A-1 type materials. Thickness = 6 inches throughout.

2. Subbase - To have a minimum CBR of 25%, materials used will be A-1 type materials or stabilized A-4 type materials. Thickness varies with CBR of subgrade, ranges from 2 to 8 inches.

3. Embankment Fill - To be of select borrow material compacted to 95% Standard Proctor Density, with upper 12 inches compacted to 100% Standard Proctor Density.

FIGURE 2

RESULTS OF CLASSIFICATION, COMPACTION & C.B.R. TESTS ON ELEVEN SAMPLES

Sample No.	Natural Water Content %	Atterberg Limits W 1	Atterberg Limits W P	Atterberg Limits P 1	Mechanical Analysis % Passing N° 10	Mechanical Analysis % Passing N° 40	Mechanical Analysis % Passing N° 200	AASHO Designation	Standard Proctor Optimum Moisture %	Standard Proctor Optimum Dry Density lb/ft3	California Bearing Ratio Dry Density lb/ft3	California Bearing Ratio C.B.R. % Dry	California Bearing Ratio C.B.R. % Soaked
1	11	28	24	4	96	83	80	A-4 (8)	19	104	-	-	-
2	21	30	19	10	99	87	77	A-4 (8)	18	105	106	20	4
3	25	32	24	7	99	89	88	A-4 (8)	18	104	-	-	-
4	17	31	25	6	95	74	73	A-4 (8)	18	104	100	23	-
5	29	32	23	10	99	90	88	A-4 (8)	17	106	-	-	-
6	35	46	29	17	99	88	87	A-7-6 (12)	25	98	94	17	3
7	25	36	26	10	100	95	94	A-4 (8)	22	104	-	-	-
8	22	28	24	4	100	96	90	A-4 (8)	16	107	108	31	4
1 - A	10	23	21	2	100	94	87	A-4 (8)	17	107	106	42	9
2 - A	9	22	22	-	99	89	79	A-4 (8)	12	112	-	-	-
3 - A	8	33	32	1	100	93	87	A-4 (8)	16	108	107	20	6

ECONOMIC ANALYSIS ANNEX IV-A

TABLE OF CONTENTS

The Project (Description) 1

Project Alternatives 3

Social Criteria and Community Cohesiveness 3

Cropping Patterns and Land Use 8

Production & Introductory Subsistance Credit 8

Methodology of Economic and Financial Analysis . . . 10

Farm Incomes 11

Project Analysis; The Farm Budget Models 12

Farm Size and Income Distribution 13

Farm Gate Prices 16

Small Farm Budgets 22

Employment 23

Land Clearing 30

The Transport Model 35

Summary of Returns 41

Exhibits 1-15 45-85

I. The Project

A. The fundamental goal of the New Lands Settlement Project is to increase Bolivian food production while expanding employment and increasing small farmer incomes. Stimulating the settlement rate, while minimizing settlement abandonments will be prime criteria for success. Other criteria considered will be the socio-economic measurement of the individual farm family's return on labor and management. This program promises to differ from prior colonization programs by easing the external controls so common in directed government programs while providing external stimulus through a semi-spontaneous colonization effort. Using a semi-spontaneous approach, the project will encourage groups within communities (totalling some 10,000 Altiplano Indians) to transfer their basic communal socio-economic structure to the New Lands project area. The project recognizes that trying to change social structures in the interests of economic growth is descriptive and a leading cause of colonization failures.

As outlined in Section II, Project Description, the project site lies on the frontier of northeastern Santa Cruz, Bolivia. It contains some 1,500,000 hectares of which 500,000 will be dedicated to the New Lands Development Scheme. Nestled next to the virgin portion of New Lands site lies somewhat settled lands, occupied spontaneously by approximately 6,000 settlers. This part of the project, wanting for increased economic activity, requires a minimum input of basic infrastructure, in order to provide greater access to the established markets in nearby Montero Santa Cruz.

Consolidation of the existing settlement project will be accomplished primarily through the construction of the road network and by the tying of the project to the institutional and administrative framework of the virgin lands.

The project as a whole will receive extension services, credit, training and orientation, potable water and a minimum level of medical and educational services.

Presently the rate of migration to the Bolivian low lands is increasing rapidly, largely spontaneously to the Santa Cruz frontiers. The spontaneous colonization is simply induced by either new roads or lumber trails traversing the northeastern area. Only the hearty and determined

survive the hardships encountered in the spontaneous activity. The lack of potable water and other basic social facilities have been the underlying causes for extremely high abandonment rates of these areas. The abandonment rate,* 41% in some areas highlights the need for something more than a basic road. It is the opinion of the project committee that the aforementioned complementary provisions are the essential mix of services for the success of the New Lands Development Model.

B. The Altiplano

The Altiplano campesino makes up the majority of Bolivia's rural population (85%), and occupies 34 percent of the land area. Farm size in the Altiplano is predominantly minifundia as a result of the Agrarian Reform activities dating back to 1953. Population growth and inheritance are further subdividing the relatively small plots. The Altiplano is becoming more and more over-populated relative to its capacity to produce. In contrast, the low land area is characterized by large amounts of arable lands but a very limited population. Evidence indicates that production and income of migrants in the low land settlement areas are significantly higher than in the Altiplano which in turn indicates inefficient allocation of human resources in the agricultural sector.

Based on such production and income differentials, there are three principal effects to be achieved by facilitating the growing population shift from the Altiplano to the low land valleys. First, the global output of the agricultural sector (and the economy) will be increased since such labor produces a greater output in the Oriente than it would in the Altiplano; second, the mix of production will be shifted to crops that can be produced in the New Lands and are currently in short domestic supply or can be exported. Finally, the level of income of the campesino will tend to be raised in both regions of the country. It is raised in the New Lands because the settler works more land and produces more, in contrast to the output in the Altiplano environment. Since the land pressure is reduced by this migration, the incomes and family consumption of those who remain tend to increase.

---

* Ref: The Import of Access Roads on Spontaneous Colonization- Thomas C. Royden & E. Boyd Wennergren, Utah State, Univ., Logan, Utah. 1973.

C. Project Alternatives

The project as described in Section III includes a mix of virgin and settled areas of approximately 500,000 hectares. As presented, the project provides no basis for alternatives on a regional base nor does it provide alternatives arising from the relative linkage between growth in the agricultural sector and other sectors. This, of course, negates the appraiser the opportunity to test through comparative analysis a mutually exclusive choice among available alternative project sites throughout Bolivia. The proposed site has, however, undergone extensive analysis by the INC, USAID and Utah State Univ. contract team based largely on historical data and experience. Intuitive deductions and governmental decisions to proceed with this program, under new criteria, were weighed based upon national priorities and extensive agronomic surveys of the region. This approach is not uncommon. Most settlement or development projects submitted to the IDB, World Bank or AID have been given few opportunities to appraise their respective projects within a national or regional development framework, therefore, most loans are evaluated and approved on a project-by-project basis. This project, given the extensive requisite meterological, agronomic and sociological studies and appraisals (see bibliography), accepts the pre-requisite of a mutually exclusive appraisal of project location and scope.

II. Social Criteria and Community Cohesiveness

A. Recent observations by Aiken, Wennergren, Keller and Royden* have determined that for the large part the rates of settlement abandonments within Bolivia are almost invariably caused by sudden withdrawals of government assistance in the directed colonization programs or in the case of spontaneous colonization by a discontinuity of social structure, health, chaotic marketing and general social deprivation.

One prime factor which distinguishes the present from past projects is the social homogeniety of the settlers to be assigned to the New Lands project. In essence the community structure and social norm will be transferred from each Altiplano community as like groups will be settled in designated sections of the project area.

---

*/ Ref: Evaluation of Tropical Colonization project in Latin America, IBD, June 1970, Wash., D.C.

This approach, largely based upon Sieler,* suggests that when uncertainty of change exists, such as questionable land ownership, rapidly changing technological factors or ethnic (or political) segregation within the community, or any faction which tends to disrupt the social equilibrium within the community, the family units will tend to abandon the area. Increased abandonment rates in the directed programs are witnessed shortly after withdrawal or government support or as disinterest and neglect by the administrators grows. This, then suggests that a community association of one people will expedite not only the rate of settlement into the project area but will also increase the rate of social harmony.

This is not to say that spontaneity (and heterogeneity) in the pure sense will always be constrained with social problems. Over time, the constituents of a spontaneous settlement, will set about, through shared ideas, to determine an equitable and acceptable social norm which finally establishes a new level of social equilibrium within the community. Time then is the dependent variable in which a comparative analysis of directed vs. spontaneous colonization can be based. On the assumption that changes in social equilibrium whether by internal or by external forces are disruptive, it can be illustrated how the rates of growth of the two extreme settlement concepts may affect net national returns and what will be the effect of foregoing the project investment. For instance, comparative settlement data, Table I, suggests empirically, that stimulated development outweights the effects of spontaneous development in terms of discounted net production. The underlying assumptions here are that given a time frame of 35 years, and a perfect elastic market, initial investments in the programs amounting to $ +1.5 million (due to timber revenues) and $ -1.2 million due to the net investment of the road, compared to growth patterns of 15% and 4% respectively, and the deferred investment of a road to year 15, that the net present value would amount to $71 million, over a period of 20 years. This provides an investment ratio of 5.9 to the advantage of the New Lands Program.

---

*/ Sieler, John A. Systems Analysis in Organizational Behavior, Harvard University, Irwin-Dorsey Series in Behavioral Science. Richard D. Irwin Inc., & The Dorsey Press, Illinois.

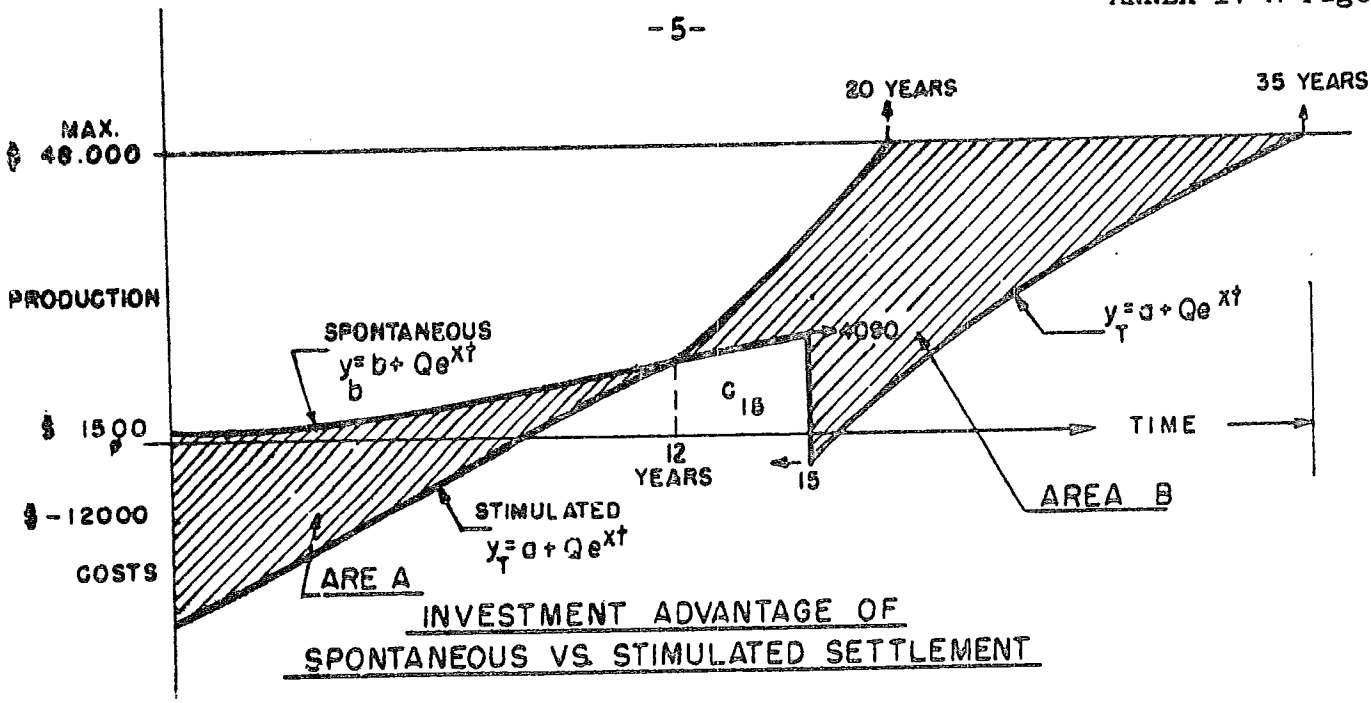


TABLE I

Where x = rate of stimulated development
r = rate of spontaneous development
a&b = present economic activity
i = opportunity cost of capital

Therefore, the net advantage in relative (production) output becomes:

$$\Delta PV = \int_0^{35} (a+Qe^{-xt})e^{-rt}dt - \int_0^{35} (b+Qe^{-rt})e^{-it}dt + C_{15}e^{-it}$$

Another aspect of this concept is illustrated by the tremendous success of the Japanese, Okinawa and Mennonite* settlement projects only a few short miles from the proposed areas.

---

*/ This is not to say that the Mennonite, Japanese or Okinawan programs correlate to the present program. On the contrary the foreign settlers brought with them: technology, capital, government assistance and solid lines of credit. All, however, were bound by several common denominators... they are ethnically homogen ous bound by social normative structures...and are religiously unified.

Keller-Aitken** describe the social and cultural factors of the Altiplano campesino and stress the desirability of transferring their psycho-social structure to the New Land Development areas.

Geographically, the New Lands present a catalyst for rapid change in the socio-cultural situation. Therefore, to maximize the likelihood of project success, socio-cultural and psychological considerations have been incorporated into the model, by emphasizing social and anthropological homogeneity of settler groups. Subjectively, Keller-Aitken have outlined a method of colonization that closely relates not only the direct socio-cultural needs of the campesinos but also provides limited government sponsorship and direction. Their program is lacking only in implementation detail and start-up issues unique to this particular scheme, such as, land clearing and the initialization of farm capital and short-term credit needs. These issues are discussed later.

B. The private sector participation (i.e., the commercial farms) lays the foundation for the transfer of new technology. While New Lands sets out to maximize the overall production, it becomes quite apparent that project maximizing conditions could soon be diminished in a labor scarce environment if, for instance, the commercial farms and the small scale farmer tended crops, which were coincidental in their growing patterns (thereby requiring simultaneous harvesting, or planting).

Obviously the small farmers could be attracted to the higher labor wages offered by the commercial farms in this frontier environment. Almost assuredly the commercial farms will concentrate on cotton, soybean and cane production in that order of priority. Presently, the commercial cotton farmers are turning to mechanized farming in an effort to alleviate labor requirements and maximize profits. Last year, some cotton was left unharvested due to the tremendous labor scarcity in the area. As the reader will note (in Figure II) only rice and peanuts conflict with the cotton cycle, and insofar as the labor requirements for cotton will

---

** Gorden Keller & Percy Aitken. Socio-cultural Factors in Colonization in Bolivia, an Integrated Model for New Lands Development. Utah State Univ./USAID/RDO, Nov. 1973.

be minimized through mechanized farming there appears to be no immediate concern for small farm abandonment to the cotton farms. Sugar cane, which has a five year planting cycle, offers a labor conflict only to off season (winter) wheat and late potatoes.

This investigation provides an insight to the overall project compatibility and indicates that the small farmer will be assured of employment during his slack time. It is in this light that the close exposure to the commercial farms, complemented with extension services, that new and improved methods of farming will be transferred to the campesino.

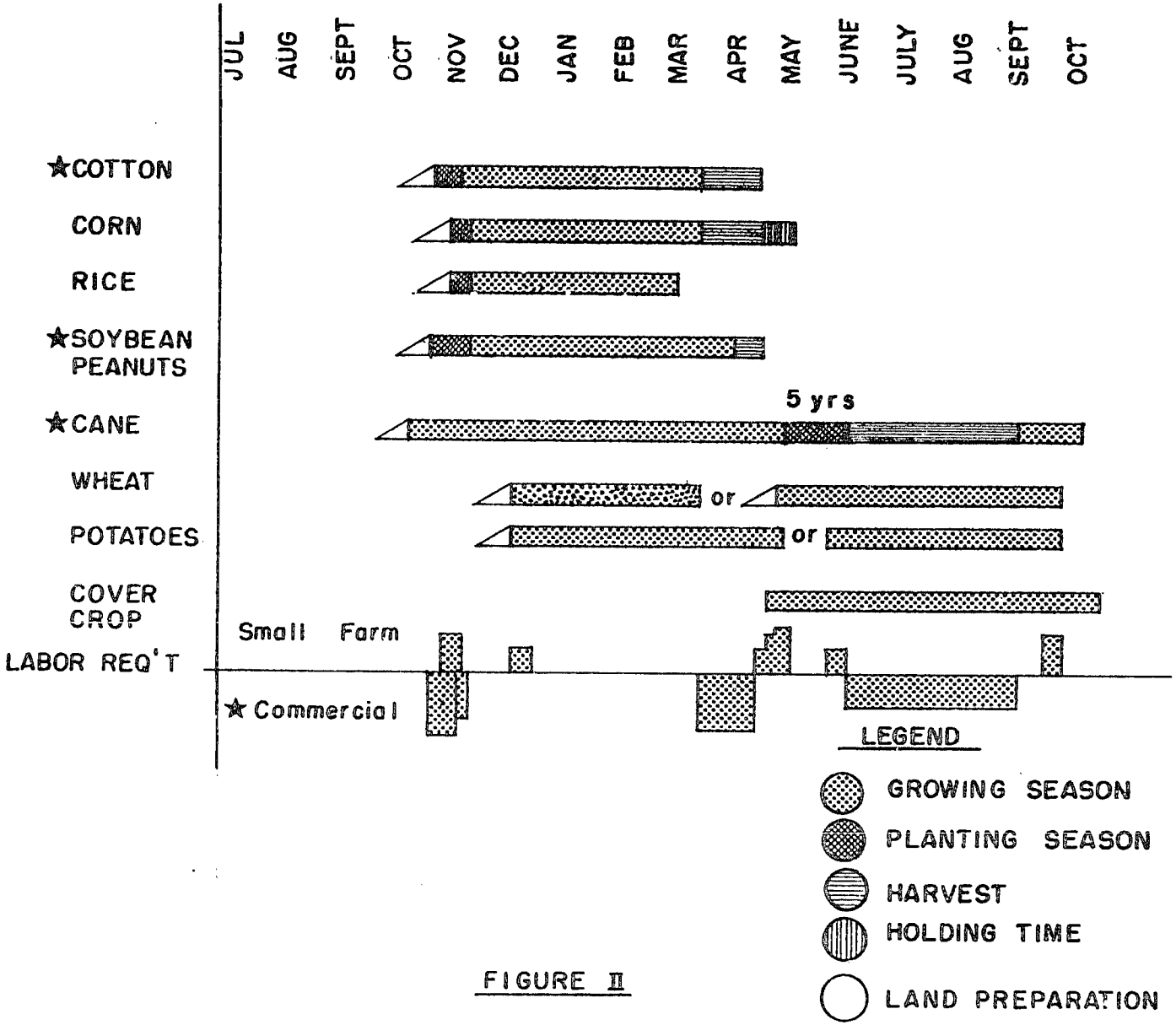

JUL
AUG
SEPT
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUNE
JULY
AUG
SEPT
OCT
★COTTON
CORN
RICE
★SOYBEAN
PEANUTS
★CANE
5 yrs
WHEAT
or
POTATOES
or
COVER
CROP
Small Farm
LABOR REQ'T
★ Commercial
LEGEND
GROWING SEASON
PLANTING SEASON
HARVEST
HOLDING TIME
LAND PREPARATION

FIGURE II

III. Cropping Patterns and Land Use

Early in the intensive review, Mr. James Livingston, AID agronomist, sought to compile various soils data to compare and formulate the typical farm profile. Exhibits I-III illustrates the cropping pattern which utilizes as much as eleven hectares in the initial five years.

To illustrate, the basic consumption requirements were derived based upon the nutritional values of 637 kgs. of corn, 568 kgs. of vegetables which are produced in the garden, 637 kgs. of rice, and 227 kgs. of potatoes. In practice, one individual small farmer may concentrate on his vegetable garden and potatoes, another on his vegetable garden and rice, and etc. The end result is a trading system of rice for potatoes or the marketing of their respective surplus. For analytical purposes, the models developed here assume that each farmers must cultivate and produce a minimum portion of each basic staple, thereby simplifying the compilation when aggregating the returns.

The importance of interactiveness, within the community (and the transfer of whole communities) again becomes apparent in that each individual must have cognizance of his neighbors expertise and preference toward each crop.

Production & Introductory Subsistance Credit

There are pitfalls within any major settlement program, some require special attention and external assistance. For instance, in the introductory phase, it is felt that credit for production and family support will be required, when the farm family in lieu of working capital must clear, purchase seed, plant and wait upon harvest before any real return is realized. Assisting and urging the farm family through this "crucial period" has been duly considered through a short-term credit fund built into the farm family budgetary model. Once over "the hump" at year one, and well into the repitition of the next planting cycle, the farmer may then enjoy some leisure and begin to plan beyond his basic social needs.

At the outset it should be noted that inputs into virgin lands should not stop at the project area. This project as mentioned earlier has a component which often tends to be ignored in traditional colonization programs. That component, of course, is the Altiplano itself. Increased welfare, due to the decrease in land pressure on the Altiplano, must be accounted for whether through increased consumption on the farm or increased surplus in the domestic or external markets.

This increase is measured in the project analysis in terms of additional consumption by the remaining community and through decreased unemployment in the Altiplano region.

The added surplus in the Altiplano, presumably increased consumption, provides a direct measure to community better ment for those who remain behind. Considering the four basic consumption crops--rice, corn, yuca, and vegetables, and the respective present consumption rates of 752 kgs., 552 kgs., 228 kgs. and 483 kgs., the overall adjusted increase in net present value amounts to approximately $304,000* per year.

Since the selection of the settlers has not yet begun, the employment status of the settlers remains relatively unknown. Presumably most will have experienced considerable underemployment which may come out in settler applications and/or questionnaires. This factor should be given considerable attention and study with respect to formulating a general colonization model providing future analysts a benchmark measurement of generated employment.

---

*/ The added consumption (of $167,000/year for 6,000 families) will not occur immediately. A time lag of 2 years was considered for purposes of the analysis. This figure was derived by discounting the value of consumption at 12% for 10 years down to year 2, then discounting the future sum for 2 years.

Methodology of Economic and Financial Analysis

This section of the report sets out to measure the economic and financial returns of the New Lands Development Scheme. It offers no new or novel conclusions with regard to the financial aspects.* The ensuing economic analysis will focus mainly on the farm family earnings, and will treat farming, and the returns to farming labor, as the primary measurement. Aggregating the farm family returns, along with the governmental expenditures, will yield the net national returns while providing reasonable benchmark data for future project appraisal. In short, the appraisal will illustrate the net returns to the farmer and the project as follows:

a. The returns to the farmers' labor and management, further refined with a sensitivity analysis in regards to price changes and wage increases.

b. The net national returns due to the investment package

c. The returns due to the components of commercial farms considering a diversified scheme of equal cropping of cotton, cane and soybeans.

In the past, spontaneous and directed colonization have de-emphasized the subject family as a criteria for success. It is felt, that, if the farmer-settler doesn't have a reasonable expectation of success, he will forego the venture, or quickly lose interest in the project and return to his more familiar setting.** A difference can be drawn from past colonization programs by the approach taken here; one which seeks a balance between paternalistic governmental direction

---

* Annex I, however, illustrates the regional net value added due to the road system. This somewhat new approach was fashioned after Arturc Isreals (IBRD) concept derived in Working Paper #70 IBRD.

** For a basic understanding of the constituents within a farming program, such as the New Lands, two pre-requisites are required: (1) Farming is a business (and a way of life). It has its risks and uncertainty and returns must be equally commensurate with those risks. (2) Although our farmers are illiterate they are not stupid, to the contrary, they are probably most efficient businessmen, have a propensity to save beyond most similar small businessmen, responds to uncertainty with a farm family garden (or insurance crop which he gives his highest priority) or a small storable good which would sustain the family through hard times.

and chaotic spontaneity. One might describe this approach as laden with traditional empathy (a capacity to put ourselves in the roles of the Altiplano Indian) while striving for an acceptable increase in the gross regional product.

In the Bolivian context, the Altiplano family, as most farm families, is bound together with common goals ultimately measured by their farming achievements.

The individual farm family then stands as an important measure of the projects success; their decision will determine the obvious initial impact; i.e., the rate of settlement and finally, social cohesiveness.

Farm Incomes

At full agricultural development, cash returns per farm family after deducting all production costs, including hired labor, but before payment of project charges and income tax will vary between $1,070 and $3,500 per year. Accumulation of capital equity was not realized until the fourth year, where the typical farm income reached $203/year after satisfying the consumption requirements.

Insofar as the returns to the farmers management and labor were concerned, the farm family budget was detailed to include the actual building up of the 33 hectare plot including trails with and without mechanized land clearing and other sensitive line items.

VI. Project Analysis

A. The Farm Budget Model (Summary)

From the standpoint of the small farmer the Farm Budgets consider all normal anticipated production costs and consumption for a statistically average family of 5.4 persons. The family working force consists of two adults, and three children, one whom approaches adulthood.

Consequently, the make-up of the farm budget first considered the probable hand clearing pattern for land use based primarily on the cropping pattern provided by the agronomic investigators. Once the program expenditures, family consumption and yields are assigned the computerized model was assembled, based largely upon the assumption that labor intensivity would be emphasized; then run through four iterations providing the farmer with land holdings of 20, 30, 40, 50 hectares of land. Having established the farm size, credit and the minimum income of $210 (after consumption) were held constant. The minimum income criteria then provides a basic incentive, including the risk and uncertainty, as a minimum attractive return for the farm unit.

The initial budget runs provided a spread of land scale between 20-30 hectares.* Consequently, the selected optimum land size of 33 hectares was taken which also provides the necessary incremental return for possible future mechanization. While cognizant of the varying degrees of ambition between farmers, three farm models were then formulated to provide a more reliable simulation of probable farm events.

---

* Eight hectares of land was determined as non-cultivatible, house plot, roads and/or drainage, vis-a-vis 33-8 = 25 hectares. In the transport model, 33 has. was held constant and regional value added maximized. The outcome utilized 28.99 has. with a slack (non-cultivable) area of 4 has. Thereby substanciating the 33 has. farm plot size.

B. Farm Size and Income Distribution Aspects

Public programs for the development of new lands in the humid tropics are usually weighed toward the social implications of improving income levels for landless peasants. The programs generally do not make explicit the degree of income improvement sought nor the possibility of conflict between income distribution and productivity objectives. Minimum income criteria are usually ignored by government agencies. Rarely is minimum income used as a design criterion; subdivision, capitalization, and production programs are generally not specifically designed to maximize the number of beneficiaries within constraints imposed by the availability of public funds and the necessity to provide reasonable assurance that the colonist would achieve an acceptable minimum income level. If it is assumed that it is politically feasible to establish a minimum income level, then the size of the farms and of capital assistance would depend on the weight assigned to maximizing beneficiaries per unit of public investment. The choice is between quantity (more people with lower incomes) and quality (less people with higher incomes). Having established the income level, the man/land and capital/land ratios can be determined mathematically, given the fixed quality of lands and climate and estimates of production costs and prices of our typical farm cropping patterns.

It is evident that equity aspects cannot be divorced from production objectives in setting farm size. With respect to income distribution the question arises whether the areas are too large, since in a number of cases the per capita income objectives are more than five times the 1960-65 national averages for the group to be assisted by the New Lands program.

If production and economic efficiency are to be achieved, New Lands development cannot be viewed within a static framework. As the region evolves, the system must be flexible enough for those with ability and savings to put these assets to productive use in the form of expanded agricultural operations. In theory the structure of land tenure, exchange and sale of property, renting, labor regulations, extension, and credit should not be directed toward retaining a rigid relationship between land, labor and capital. The approach to this problem in the initial

---

* Michael Nelson, The Development of Tropical Lands, Policy Issues in Latin America.

stages was to attempt to subdivide into various farm sizes, up to a maximum of 33 hectares, basing the size-groups on the expected demand for land.

The effect of yield decline further complicated the determination of farm size. Where settlement takes place on tropical soil of only moderate or low fertility, a change from annual cropping to pasture and tree crops becomes inevitable. The consequences of this restructuring are two fold. First, if the change is to pasture and cattle, such as projected in typical FARM TYPE C, either in a rotation or as a specialization activity, holdings of a larger size than the original subdivision may be required. Second, considerable additional capital is required. These factors are evident in the New Lands Development and are accounted for with a substantial "growth factor" in the selected farm size. Thirty-three hectares provides a reasonable farm scale while minimizing the overall project cost per farm family.

Capital flow is one of the most controversial issues in formulating public policy for the development of new lands. Debate centers on such aspects as mechanized versus hand clearing, the requirement for high levels of inputs, technology and management versus the settlement of inexperienced colonists who lack funds, economies of scale versus the creation of minimum farm units, and the key role played by the interrelated structural factors that influence credit, extension, marketing, and land titling. These factors affect both the amount and the source of the capital required. For example, mechanized forest clearing in the Santa Cruz region requires a cash outlay of $350-450 per hectare relative to $100-150 for contract hand felling and burning and less than $10 for clearing done by unpaid family labor. Respectively, the timing factor of each clearing technique also varies inversely. Where ownership is in the hand of colonists who have little or no resources of their own, it follows that the government would have to become heavily involved in credit operations, probably subsidized, if agriculture is to be developed beyond the subsistence level.

In examining the level of capitalization one might argue that a government cannot deliberately associate itself with a project that will merely be an extension of subsistence agriculture. In these circumstances governments must seek a comprise between acceptable income levels and the number of beneficiaries encompassed by public programs with limited funding. Thus income distribution is involved to the extent that the state has the option of spreading its programs thinner. The alternative consequences of compromise are:

1. Colonists may be required to have some minimum resources of their own, Farm Type A where a family needs approximately $250 to get started.

2. Colonists may be granted significant privileges in comparison with the average campesino in terms of credit and the quality of extension services.

The rate of land development is prescribed by land-clearing procedures and production technology. In cases such as New Lands where the investment in subdivision, feeder roads, and drainage amounts to $625 per hectare, economic justification suggests a course of action providing the option of mechanized clearing on a moderate scale and a somewhat intensive agriculture. Experience on projects indicates that it would take a colonist five to eight years to clear 10-15 ha and even then he would probably dopt a bush-fallow system whereby only 3-5 ha were in production annually. Assuming a net addition to land in production of 2 ha per year per colonist on a 12 ha plot, annual net value added per hectare would have to average $150 if an infrastructure investment of $650 per hectare is to show a 15 percent return.

Subsidy

The present legal requirements of Bolivia sustain a 10% interest * rate ceiling on production credit which in effect subsidizes the resent borrowers, most of whom are well organized commercial and semi-commercial farmers. Small farmers, until recently (when the FRA Agriculture Bank was created), were excluded from the normal banking system. There is evidence that prior to the FRA program, the larger farmers were securing their loan funds through organized formal money markets and banks at subsidy rates, while the small farmers were securing their credit from informal and unorganized sources at rates that were considerably higher. Provision of loans to FRA farmers, therefore, had some merit in providing them with a "share of the pie" also at subsidy rates. Another justification for these subsidy rates in the case of the smaller farmers served by fRA related to their risk sensitivity, because many are so close to subsistence levels of living. The new loan enables the small-farmers to adopt a new practice or technology that involves an additional cost, the subsidy rate encourages him to try it, and the agricultural extension services provided gives him added technical backstopping with the new practice.

* However, a new rate of 12% is contemplated in the near future based upon proposed government decree.

C. Farm Gate Prices

Presently, the government of Bolivia operates through a fixed price program for corn, rice and wheat. Basically, a "perfect market" approach would hold a highly competitive situation where equilibrium would occur providing each commodity a price close to its marginal value product. This, however, is not the case in Santa Cruz where market* prices are sporatic and continually fluctuating reflecting the demands of external markets, such as Brazil, which overwhelm the internal market which remains largely fixed for the aforementioned commodities. This situation only emphasizes the questionability of the internal prices and accentuates the imperfection of the overall market. Therefore, in the farm budget analysis the "financial prices" were normalized somewhat to reflect an average in the long run and further simplified the empirical values required in the farm budget runs. Subsequently, benefits and returns reflect equally this normative approach enhancing the overall credibility of the budget program.

The following long term farm gate prices in (U.S.$) were used throughout the small farm budgets:

Corn	75/ton
Rice	140/ton
Potatoes (YUCA)	140/ton
Soybeans	180/ton
Wheat	100/ton
Cattle	.90/kg
Sugar Cane	6/ton
Cotton	0.52/lb.
Peanuts	0.40/kg
Vegetables	US$200/ton

D. Farm Models

Commercial Farms

The following model illustrates a typical commercial farm which reflects the present regional trends. Insofar as soybeans and cane are concerned, it is felt that a decline in production may be in the offing reflecting a somewhat diminished demand especially for soybean if present price levels persist and for other local labor reasons sugar may be less attractive also. However, in order to

---

* At the time of intensive review, markets, as witnessed in the Santa Cruz area, were highly volatile and sporatic. For the purposes of project analysis, it is felt that above averages would suffice.

present a fair profile of the commercial farms the three main crops were consolidated into one commercial farm unit. In this fashion, probable diversification was reflected and risk and uncertainty of future market levels were diminished somewhat. A review of the cotton potential within the colony areas reveal that although there is little cotton produced on the small farms, favorable factors exist for future small farm production.* One such factor is the transfer of new technology passed on to the small farmer from the commercial farm participants. Another which places both farm classes in a favorable position is the fact that current world demands for cotton, substituting for the more fashionable petroleum derived materials (dacron polyester, etc.) are re-emerging. This demand now provides an additional incentive leaning toward mechanized harvesting methods of cotton. The small farmer undoubtably will benefit if they chose to cultivate cotton because of the premium price commanded by hand packed cotton. In short, the commercial farm budget included the purchase of all farm implements necessary and two large D-8H caterpilar tractors used for land clearing and leveling. Credit provided through the commercial windows included a 20% interest rate provided for 7 years. The computer program provides an automatic repayment schedule, amortizing through the given constraints. It assumes that all loans are made at the beginning of the year requiring the first payment at the end of year one. (Subsidized credit was confined to the small farmer only.) Hired labor in the frontier area commands a premium wage of U.S.$1.50/man-day.

---

* The Impact of Access Roads on Spontaneous Colonization. Thomas Royden and E. Boyd Wennergren, Utah State Univ., Logan, Utah, 1973.
Agricultural Life in the Colonies - An Economic Study of Ten Colonies. Rural Work Committee, Methodist Church in Bolivia.

AGENCY FOR INTERNATIONAL DEVELOPMENT
FINANCIAL ANALYSIS

DATE: 4/23/74

COMMERCIAL FARM

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: (33 HECTARE)										
COTTON	50.00	50.00	75.00	100.00	150.00	150.00	150.00	150.00	150.00	150.00
SOYBEANS	0.0	50.00	75.00	100.00	150.00	150.00	150.00	150.00	150.00	150.00
SUGARCANE	0.0	50.00	100.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00
TOTAL LAND IN USE	50.00	150.00	250.00	350.00	450.00	450.00	450.00	450.00	450.00	450.00
YIELD: (TONS/HECTARE)										
COTTON	1.20	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
SOYBEANS	0.0	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	[illegible]
SUGARCANE	0.0	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	[illegible]
OUTPUT: (TONS)										
COTTON	60.00	75.00	112.50	150.00	225.00	225.00	225.00	225.00	225.00	225.00
SOYBEANS	0.0	70.00	105.00	140.00	210.00	210.00	210.00	210.00	210.00	210.00
SUGARCANE	0.0	2250.00	4500.00	6750.00	6750.00	6750.00	6750.00	6750.00	6750.00	6750.00
SEED REQUIREMENT 4%: (TONS)										
COTTON	2.40	3.00	4.50	6.00	9.00	9.00	9.00	9.00	9.00	9.00
SOYBEANS	0.0	2.80	4.20	5.60	8.40	8.40	8.40	8.40	8.40	8.40
SUGARCANE	0.0	90.00	180.00	270.00	270.00	270.00	270.00	270.00	270.00	270.00
ON FARM LOSSES 5%: (TONS)										
COTTON	3.00	3.75	5.62	7.50	11.25	11.25	11.25	11.25	11.25	11.25
SOYBEANS	0.0	3.50	5.25	7.00	10.50	10.50	10.50	10.50	10.50	10.50
SUGARCANE	0.0	112.50	225.00	337.50	337.50	337.50	337.50	337.50	337.50	337.50
NET PRODUCTION: (TONS)										
COTTON	54.60	68.25	102.38	136.50	204.75	204.75	204.75	204.75	204.75	204.75
SOYBEANS	0.0	63.70	95.55	127.40	191.10	191.10	191.10	191.10	191.10	191.10
SUGARCANE	0.0	2047.50	4095.00	6142.50	6142.50	6142.50	6142.50	6142.50	6142.50	6142.50
SALES: (FARMGATE)										
COTTON										
@$ 250.00/TON ($)	13649.99	17062.50	25593.75	34125.00	51187.50	51187.50	51187.50	51187.50	51187.50	51187.50
SOYBEANS										
@$ 180.00/TON ($)	0.0	11465.99	17198.99	22931.99	34397.98	34397.98	34397.98	34397.98	34397.98	34397.98
SUGARCANE										
@$ 6.00/TON ($)	0.0	12285.00	24570.00	36855.00	36855.00	36855.00	36855.00	36855.00	36855.00	36855.00
GROSS SALES ($)	13649.99	40813.49	67362.69	93911.94	122440.44	122440.44	122440.44	122440.44	122440.44	122440.44

AGENCY FOR INTERNATIONAL DEVELOPMENT
FINANCIAL ANALYSIS

COMMERCIAL FARM

DATE: 4/23/74

FARM BUDGET W/PROJECT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
EXPENDITURES:										
FARM LABOR ($)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
FARM HAND CLEARING ($)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
FENCING ($)	2000.00	2000.00	2000.00	2000.00	0.0	0.0	0.0	0.0	0.0	0.0
MINERALS&MEDECINES ($)	0.0	0.0	50.00	100.00	100.00	100.00	100.00	100.00	250.00	250.00
HIRED LABOR CLEAR. ($)	350.00	480.00	480.00	430.00	450.00	130.00	140.00	150.00	350.00	380.00
HIRED LABOR PROD. ($)	12500.00	12500.00	14874.00	50000.00	70000.00	70000.00	70000.00	70000.00	70000.00	70000.0
MECH CLEARING@$375/HA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PURCHASE EQUIPMENT ($)	160000.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL EXPENDITURES ($)	174850.00	14980.00	17404.00	52530.00	70550.00	70230.00	70240.00	70250.00	70600.00	70630.00
ADJ. CASH INCOME & EXP.										
CASH OUTLAY ($)	-20000.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOAN-PROD. CREDIT ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOAN REPAYMENT 10% ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INTER. CREDIT 20% ($)	108386.31	-41613.63	-41613.63	-41613.63	-41613.63	-41613.63	-41613.63	0.0	0.0	0.0
PURCHASE CATTLE ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FARM FAMILY NET REV. ($)	-72813.69	-15780.14	8345.06	-231.69	10276.81	10596.81	10586.81	52190.44	51840.44	51810.44

-19-

AGENCY FOR INTERNATIONAL DEVELOPMENT
ECONOMIC ANALYSIS

ATE: 4/23/74

COMMERCIAL FARM

LEMENT BENEFIT W/PROJ		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
OAN ELEMENT	($)	88386.31	-41613.63	-41613.63	-41613.63	-41613.63	-41613.63	-41613.63	0.0	0.0	0.0
AIVAGE VALUE	($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ET ECONOMIC REVENUE	($)	15572.63	-57393.77	-33268.57	-41845.32	-31336.82	-31016.82	-31026.82	52190.44	51840.44	51810.44
ON-CASH COST:											
VALUE OF SUBSIDIES	($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FAMILY LABOR	($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WAGE LABOR	($)	12850.00	12980.00	15354.00	50430.00	70450.00	70130.00	70140.00	70150.00	70350.00	70380.00
ET BENEFIT 33 REC.	($)	28422.63	-44413.77	-17914.57	8584.68	39113.18	39113.18	39113.18	122340.44	122190.44	122190.44

The return on investment

YR	NET CASH FLOW	DISCOUNT RATE0.10	DISCOUNTED CASH FLOW	DISCOUNT RATE0.20	DISCOUNTED CASH FLOW
.1.	-72813.00	1.1000	-66193.63	1.2000	-60677.51
.2.	-15780.00	1.2100	-13041.34	1.4400	-10958.34
.3.	8345.00	1.3310	6269.74	1.7280	4829.29
.4.	-231.00	1.4641	-157.78	2.0736	-111.40
.5.	10276.00	1.6105	6380.61	2.4883	4129.70
.6.	10596.00	1.7716	5981.20	2.9860	3548.59
.7.	10586.00	1.9487	5432.32	3.5832	2954.37
.8.	52190.00	2.1436	24347.19	4.2998	12137.77
.9.	51840.00	2.3579	21985.39	5.1598	10046.98
10.	51810.00	2.5937	19975.17	6.1917	8367.64
.					
.		PW1=	10978.96	PW2=	-25732.82
.					
.					

THE RATE OF RETURN IS 12.99%

E. Small Farm Budgets

As aforementioned, one of the primary objectives of the small farmer budgets was to highlight the requirements for a minimum family income. It then follows, given this necessary condition that a reasonable assumption for credit beneficiaries would equate to a credit program as suggested earlier providing some 350 /year in the first few years.

This approach ties neatly together in the following farm budgets. It also provides a broad overrun to the additional credit necessary for the production credit to meet the presumed standard.

Over the long run, however, a higher standard of income must be established, sufficient to provide increased living standards, plus maintain a margin for savings and re-investment.

The following results show that given a normal development rate, constrained by the land clearing capabilities and family size, that the cropping pattern chosen will provide a return to the farm family labor and management of slightly more than 48%. (See Farm B on following tables.) Farm B assumes a more labor intensive land clearing method, mainly dependent on credit availability which supports that additional labor required for clearing. Immediately apparent is the multiplier effect of credit toward so-called secondary effects such as additional production inputs (farm, labor and its subsequent effects) as a direct result of the policy decision toward the credit.

Farm A, on the other hand, was built up to include mechanical clearing in combination with some farm family clearing. The immediate results indicate a lesser return on the family labor (about 21%) however, provides less opportunity for employment. Employment here is generally taken as "clearing labor" which just meets the rate of farm development of Farm B. Obviously, the first impression taken from the return comparison is to opt for Farm B.

However, in the labor scarce frontier environment Farm A utilizes less "clearing labor" along the development flow and is more apt to succeed. This gives rise to the employment aspects as dependent on the level of technology used in clearing the land. As an aside, Farm C was designed to simulate a variance of possible production based largely upon a small dairy livestock program. (See Exhibit 5.) Although the overall returns are considerably higher, over 50%, the production requirements heavily lean toward large capital availability. Farm C represents a likely alternative given a special credit mechanism for the purchase of livestock, but provides very little employment opportunities for the region. Given the present level of technology of the Altiplano farmers, it is felt that this alternative would be negated based upon constraints of risk and credit availability.

Overall Employment Aspects

As part of the sensitivity analysis, the assumption of increased "clearing labor" wage rates were used to determine the overall effect of net farmer incomes. As noted in Exhibit 8, a 20% increase in wages starting from the third year would reduce the net family returns on Farm A to about 8%. Farm B on the other hand, illustrates a reduction to some 43 percent. Overall, the hired labor wage rate increase would amount to only a slight insignificant reduction in returns.

Given the paucity of labor statistics in the Altiplano, it was felt that a reasonably accurate estimate of employment generation could not be devised. However, in lieu of employment data, a rough order of magnitude would estimate approximately 1,000 man-days/year. This figure assumes that half the settlers were previously employed at less than 3 hours/day.

$\left(\frac{1038 \text{ man days}}{3 \text{ hrs./day}} \times 4{,}000 \text{ men} \times 1/2\right) \div$ First three years of employment.

AGENCY FOR INTERNATIONAL DEVELOPMENT
FINANCIAL ANALYSIS

DATE: 4/23/74

FARM TYPE B

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: (33 HECTARE)										
GREEN	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
RICE	0.0	2.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
CORN	0.0	0.0	0.0	1.00	3.00	5.00	5.00	5.00	5.00	5.00
POTATOES	0.0	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	2.00	4.00	5.00	5.00
WHEAT	0.0	0.0	0.0	1.00	3.00	5.00	5.00	5.00	5.00	5.00
PASTURE (CATTLE)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	3.00	5.00
TOTAL LAND IN USE	0.60	2.80	4.80	7.80	11.80	15.80	17.80	20.30	23.80	25.80
YIELD: (TONS/HECTARE)										
VEGETABLES	1.80	1.70	1.50	1.50	1.50	1.50	1.50	1.50	1.20	1.50
RICE	0.0	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
CORN	0.0	0.0	0.0	1.60	1.60	1.60	1.60	1.60	1.60	1.60
POTATOES	0.0	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	1.20	1.20	1.20	1.20
WHEAT	0.0	0.0	0.0	1.10	1.10	1.10	1.10	1.10	1.10	1.10
CATTLE (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	500.00	500.00	500.00
OUTPUT: (TONS)										
VEGETABLES	1.08	1.02	0.90	0.90	0.90	0.90	0.90	0.90	0.72	0.90
RICE	0.0	2.40	4.80	6.00	6.00	6.00	6.00	6.00	6.00	6.00
CORN	0.0	0.0	0.0	1.60	4.80	8.00	8.00	8.00	8.00	8.00
POTATOES	0.0	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	2.40	4.80	6.00	6.00
WHEAT	0.0	0.0	0.0	1.10	3.30	5.50	5.50	5.50	5.50	5.50
CATTLE (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	500.00	1500.00	2500.00
SEED REQUIREMENT 4%: (TONS)										
VEGETABLES	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.04
RICE	0.0	0.10	0.19	0.24	0.24	0.24	0.24	0.24	0.24	0.24
CORN	0.0	0.0	0.0	0.06	0.19	0.32	0.32	0.32	0.32	0.32
POTATOES	0.0	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	0.10	0.19	0.24	0.24
WHEAT	0.0	0.0	0.0	0.04	0.13	0.22	0.22	0.22	0.22	0.22
ON FARM LOSSES 5%: (TONS)										
VEGETABLES	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
RICE	0.0	0.12	0.24	0.30	0.30	0.30	0.30	0.30	0.30	0.30
CORN	0.0	0.0	0.0	0.08	0.24	0.40	0.40	0.40	0.40	0.40
POTATOES	0.0	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	0.12	0.24	0.30	0.30
WHEAT	0.0	0.0	0.0	0.05	0.16	0.27	0.27	0.27	0.27	0.27

AGENCY FOR INTERNATIONAL DEVELOPM.
FINANCIAL ANALYSIS

DATE: 4/23/74

FARM TYPE B

FARM BUDGET W/PROJECT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
HOME CONSUMPTION: (TONS)										
VEGETABLES	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57
RICE	0.0	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
CORN	0.0	0.0	0.0	0.64	0.64	0.64	0.64	0.64	0.64	0.64
POTATOES	0.0	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
MEAT (CATTLE) (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.00	91.00
NET PRODUCTION: (TONS)										
VEGETABLES	0.41	0.36	0.25	0.25	0.25	0.25	0.25	0.25	0.09	0.25
RICE	0.0	1.32	3.50	4.59	4.59	4.59	4.59	4.59	4.59	4.59
CORN	0.0	0.0	0.0	0.82	3.73	6.64	6.64	6.64	6.64	6.64
POTATOES	0.0	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	2.18	4.37	5.46	5.46
WHEAT	0.0	0.0	0.0	1.00	3.00	5.00	5.00	5.00	5.00	5.00
CATTLE (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	500.00	1409.00	2409.00
SALES: (FARMGATE)										
VEGETABLES @$ 200.00/TON ($)	82.96	72.04	50.20	50.20	50.20	50.20	50.20	50.20	17.44	50.20
RICE @$ 140.00/TON ($)	0.0	184.66	490.42	643.30	643.30	643.30	643.30	643.30	643.30	643.30
CORN @$ 75.00/TON ($)	0.0	0.0	0.0	61.42	279.82	498.22	498.22	498.22	498.22	498.22
POTATOES @$ 140.00/TON ($)	0.0	52.50	52.50	52.50	52.50	52.50	52.50	52.50	52.50	52.50
SOYBEANS @$ 180.00/TON ($)	0.0	0.0	0.0	0.0	0.0	0.0	393.12	786.24	982.80	982.80
WHEAT @$ 100.00/TON ($)	0.0	0.0	0.0	100.10	300.30	500.50	500.50	500.50	500.50	500.50
CATTLE @$ 0.90/KG ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	450.00	1268.10	2168.10
GROSS SALES ($)	82.96	309.20	593.12	907.52	1326.12	1744.72	2137.84	2980.96	3962.86	4895.62
EXPENDITURES:										
FARM LABOR ($)	(50.00)	(50.00)	(50.00)	(50.00)	(50.00)	(50.00)	(50.00)	(50.00)	(100.00)	(100.00)
FARM HAND CLEARING ($)	(247.00)	(190.00)	(190.00)	(190.00)	(150.00)	(190.00)	(190.00)	(190.00)	(190.00)	(190.00)
FENCING ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	130.00	130.00
MINERALS&MEDECINES ($)	0.0	0.0	50.00	100.00	100.00	100.00	100.00	100.00	250.00	250.00
HIRED LABOR CLEAR. ($)	0.0	300.00	480.00	450.00	450.00	450.00	300.00	300.00	350.00	150.00
HIRED LABOR PROD. ($)	0.0	0.0	0.0	0.0	180.00	360.00	450.00	480.00	540.00	540.00
MECH CLEARING@$375/HA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL EXPENDITURES ($)	0.0	300.00	530.00	550.00	730.00	910.00	850.00	880.00	1270.00	1070.00
TOTAL (MAN-DAYS)	198.	360.	480.	460.	553.	700.	660.	680.	787.	653.

AGENCY FOR INTERNATIONAL DEVELOPMENT
FINANCIAL ANALYSIS

DATE: 4/23/74

FARM TYPE B

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.										
CASH OUTLAY ($)	-150.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOAN-PROD. CREDIT ($)	350.00	150.00	150.00	150.00	150.00	150.00	200.00	250.00	250.00	300.00
LOAN REPAYMENT 10%($)	-385.00	-165.00	-165.00	-165.00	-165.00	-165.00	-220.00	-275.00	-275.00	-330.00
INTER. CREDIT 20% ($)	0.0	361.29	-138.71	-138.71	-138.71	-138.71	-138.71	-138.71	0.0	0.0
PURCHASE CATTLE ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-500.00	0.0
FARM FAMILY NET REV.($)	-102.04	355.49	-90.59	203.81	442.41	681.01	1129.13	1937.25	2167.86	3795.[illegible]
FARM RET.-LABOR/MGMT($)	-399.04	115.49	-330.59	-36.19	242.41	441.01	889.13	1697.25	1877.86	3505.62

YR	NET CASH FLOW	DISCOUNT RATE0.45	DISCOUNTED CASH FLOW	DISCOUNT RATE0.49	DISCOUNTED CASH FLOW
.1.	-399.00	1.4500	-275.17	1.4900	-267.79
.2.	115.00	2.1025	54.70	2.2201	51.80
.3.	-330.00	3.0486	-108.25	3.3079	-99.76
.4.	-36.00	4.4205	-8.14	4.9288	-7.30
.5.	242.00	6.4097	37.76	7.3440	32.95
.6.	441.00	9.2941	47.45	10.9425	40.30
.7.	889.00	13.4764	65.97	16.3043	54.53
.8.	1697.00	19.5408	86.84	24.2934	69.85
.9.	1877.00	28.3342	66.25	36.1972	51.85
10.	3505.00	41.0846	85.31	53.9338	64.99
		PW1=	52.71	PW2=	-8.57

THE RATE OF RETURN IS 48.44%

FARM B

DATE: 4/23/74

ENCY FOR INTERNATIONAL DEVELOPME
FINANCIAL ANALYSIS

FARM TYPE A

FARM BUDGET W/PROJECT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
HOME CONSUMPTION: (TONS)										
VEGETABLES	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57
RICE	0.0	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
CORN	0.0	0.0	0.0	0.64	0.64	0.64	0.64	0.64	0.64	0.64
POTATOES	0.0	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
MEAT (CATTLE) (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.00	91.00
NET PRODUCTION: (TONS)										
VEGETABLES	0.41	0.36	0.25	0.25	0.25	0.25	0.25	0.25	0.25	[illegible]
RICE	0.0	1.32	3.50	4.59	4.59	4.59	4.59	4.59	4.59	4.59
CORN	0.0	0.0	0.0	0.82	3.73	6.64	6.64	6.64	6.64	6.64
POTATOES	0.0	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	2.18	4.37	5.46	5.46
WHEAT	0.0	0.0	0.0	1.00	3.00	5.00	5.00	5.00	5.00	5.00
CATTLE (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	500.00	1409.00	2409.00
SALES: (FARMGATE)										
VEGETABLES @$ 200.00/TON ($)	82.96	72.04	50.20	50.20	50.20	50.20	50.20	50.20	50.20	50.20
RICE @$ 140.00/TON ($)	0.0	184.66	490.42	643.30	643.30	643.30	643.30	643.30	643.30	643.30
CORN @$ 75.00/TON ($)	0.0	0.0	0.0	61.42	279.82	498.22	498.22	498.22	498.22	498.22
POTATOES @$ 140.00/TON ($)	0.0	52.50	52.50	52.50	52.50	52.50	52.50	52.50	52.50	52.50
SOYBEANS @$ 180.00/TON ($)	0.0	0.0	0.0	0.0	0.0	0.0	393.12	786.24	982.80	982.80
WHEAT @$ 100.00/TON ($)	0.0	0.0	0.0	100.10	300.30	500.50	500.50	500.50	500.50	500.50
CATTLE @$ 0.90/KG ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	450.00	1268.10	2168.10
GROSS SALES ($)	82.96	309.20	593.12	907.52	1326.12	1744.72	2137.84	2980.96	3995.62	4895.62
EXPENDITURES:										
FARM LABOR ($)	(96.00)	(96.00)	(96.00)	(96.00)	(96.00)	(96.00)	(96.00)	(96.00)	(100.00)	(100.00)
FARM HAND CLEARING ($)	(247.00)	(190.00)	(190.00)	(190.00)	(190.00)	(190.00)	(190.00)	(190.00)	(190.00)	(190.00)
FENCING ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	130.00	130.00
MINERALS&MEDICINES ($)	0.0	0.0	50.00	100.00	100.00	100.00	100.00	100.00	250.00	250.00
HIRED LABOR CLEAR. ($)	350.00*	375.00	375.00	375.00	0.0	0.0	140.00	150.00	350.00	380.00
HIRED LABOR PROD. ($)	0.0	0.0	0.0	0.0	180.00	360.00	450.00	480.00	540.00	540.00
MECH CLEARING@$375/HA	0.0	750.00	750.00	375.00	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL EXPENDITURES ($)	350.00	1125.00	1175.00	850.00	280.00	460.00	690.00	730.00	1270.00	1300.00
TOTAL (MAN-DAYS)	462.	441.	441.	441.	311.	431.	584.	611.	787.	807.

-27-

AGENCY FOR INTERNATIONAL DEVELOPMENT
FINANCIAL ANALYSIS

DATE: 4/23/74

FARM TYPE A

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: (33 HECTARE)										
GARDEN	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
RICE	0.0	2.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
CORN	0.0	0.0	0.0	1.00	3.00	5.00	5.00	5.00	5.00	5.00
POTATOES	0.0	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	2.00	4.00	5.00	5.00
WHEAT	0.0	0.0	0.0	1.00	3.00	5.00	5.00	5.00	5.00	5.00
PASTURE (CATTLE)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	3.00	5.00
TOTAL LAND IN USE	0.60	2.80	4.80	7.80	11.80	15.80	17.80	20.80	23.80	25.80
YIELD: (TONS/HECTARE)										
VEGETABLES	1.80	1.70	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
RICE	0.0	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
CORN	0.0	0.0	0.0	1.60	1.60	1.60	1.60	1.60	1.60	1.60
POTATOES	0.0	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	1.20	1.20	1.20	1.20
WHEAT	0.0	0.0	0.0	1.10	1.10	1.10	1.10	1.10	1.10	1.10
CATTLE (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	500.00	500.00	500.00
OUTPUT: (TONS)										
VEGETABLES	1.08	1.02	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
RICE	0.0	2.40	4.80	6.00	6.00	6.00	6.00	6.00	6.00	6.00
CORN	0.0	0.0	0.0	1.60	4.80	8.00	8.00	8.00	8.00	8.00
POTATOES	0.0	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	2.40	4.80	6.00	6.00
WHEAT	0.0	0.0	0.0	1.10	3.30	5.50	5.50	5.50	5.50	5.50
CATTLE (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	500.00	1500.00	2500.00
SEED REQUIREMENT 4%: (TONS)										
VEGETABLES	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
RICE	0.0	0.10	0.19	0.24	0.24	0.24	0.24	0.24	0.24	0.24
CORN	0.0	0.0	0.0	0.06	0.19	0.32	0.32	0.32	0.32	0.32
POTATOES	0.0	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	0.10	0.19	0.24	0.24
WHEAT	0.0	0.0	0.0	0.04	0.13	0.22	0.22	0.22	0.22	0.22
ON FARM LOSSES 5%: (TONS)										
VEGETABLES	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
RICE	0.0	0.12	0.24	0.30	0.30	0.30	0.30	0.30	0.30	0.30
CORN	0.0	0.0	0.0	0.08	0.24	0.40	0.40	0.40	0.40	0.40
POTATOES	0.0	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	0.12	0.24	0.30	0.30
WHEAT	0.0	0.0	0.0	0.05	0.16	0.27	0.27	0.27	0.27	0.27

AGENCY FOR INTERNATIONAL DEVELOPMENT
FINANCIAL ANALYSIS

DATE: 4/23/74

FARM TYPE A

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.										
CASH OUTLAY ($)	-250.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOAN-PROD. CREDIT ($)	350.00	150.00	150.00	150.00	150.00	200.00	200.00	250.00	300.00	300.00
LOAN REPAYMENT 10% ($)	-385.00	-165.00	-165.00	-165.00	-165.00	-220.00	-220.00	-275.00	-330.00	-330.00
INTER. CREDIT 20% ($)	0.0	1083.86	-416.14	-416.14	-416.14	-416.14	-416.14	-416.14	0.0	
PURCHASE CATTLE ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-500.00	0.0
FARM FAMILY NET REV. ($)	-552.04	253.06	-1013.02	-373.61	614.99	848.59	1011.71	1809.83	2195.62	3565.62
FARM RET.-LABOR/MGMT ($)	-895.04	-32.94	-1299.02	-659.61	328.99	562.59	725.71	1523.83	1905.62	3275.62

YR	NET CASH FLOW	DISCOUNT RATE 0.15	DISCOUNTED CASH FLOW	DISCOUNT RATE 0.25	DISCOUNTED CASH FLOW
.1.	-895.00	1.1500	-778.26	1.2500	-716.00
.2.	-33.00	1.3225	-24.95	1.5625	-21.12
.3.	-1299.00	1.5209	-854.11	1.9531	-665.09
.4.	-660.00	1.7490	-377.36	2.4414	-270.34
.5.	329.00	2.0114	163.57	3.0518	107.81
.6.	563.00	2.3131	243.40	3.8147	147.59
.7.	726.00	2.6600	272.93	4.7684	152.25
.8.	1523.00	3.0590	497.87	5.9605	255.52
.9.	1905.00	3.5179	541.52	7.4506	255.68
10.	3275.00	4.0455	809.54	9.3132	351.65
		PW1=	494.15	PW2=	-402.04

THE RATE OF RETURN IS 20.51%

Land Clearing

After review of the various farm budgets, it becomes apparent that the issue of clearing and the choice of technology will have a sizable impact upon the farm family returns, leading toward greater region production (value added).

It follows that the underlying premise of promotion policy is that unless some concessions are given, capital, labor or management will not be sufficiently attracted to develop the New Lands, nor will it be attracted at a sufficient rate and in the form to meet the New Lands objectives.

Historically, land clearing has been accomplished by slash and burn techniques which is labor intensive. Capital outlays are confined to the machete and hatchet. However, one major drawback is that land cleared in this manner allows only hand cultivation as a farming alternative or at least until the large stumps rot. Further, if clearing is undertaken by the colonists, the traditional economic methodology usually considers the alternative employment opportunity of the colonists as zero. This is not the case in this frontier environment. The New Lands development differs slightly because alternative employment is not totally absent; there is relatively little employment in the Altiplano, as compared to the Santa Cruz region which is labor scarce.* Therefore, the choice of land clearing techniques should weigh the comparative economic advantage using foregone production in the Altiplano or alternative employment, vis-a-vis the prevailing wage rate in the frontier areas.

Upon consideration of capital intensive methods it might include either chemical defoliation or the use of heavy equipment. Experience with chemical defoliants would negate their use due to its prohibitive expense, unreliability with regard to winds and possible adjacent farmland damage. On the other hand, land clearing, using crawler tractor equipment for the larger trees (and stumps), is somewhat destructive with regard to top soil, resulting in a loss of organic matter.

---

* Last year some crops went unattended at harvest due to the labor scarcity.

In essence, the clearing alternative is caught up in a perplexing compromise...on the one hand it appears desirable to hold-off the national tendency toward government direction, and the other, to expedite the rate of settlement and development. The effect that these factors have on our decision should become more evident in the foregoing scheme. First, the alternative employment to land clearing is the opportunity of taking 30-40 hectares of land and farming by the forest-fallow system, or by a more intensive system if capital were available.

Given the limitations of labor supply and management to handle large numbers of workers, large scale operations are attracted to the mechanical clearing methods. Thus, regardless of the labor supply problems it becomes attractive for the labor-saving technology to assure a quick return on investment in the initial period.

During the intensive review, the issues relating to land clearing were investigated in both La Paz and Santa Cruz. Most of the major settlement groups, especially the Methodist Church, were quick to realize the almost untouched potential of timber within the New Lands boundaries. Their studies indicate that the Government Forest Reserve, the land donated to the New Lands was peppered with mahogany averaging seven trees per hectare.*

Although this figure may have been diminished somewhat through encroachment of independent sawyers, it appears that possibly an average of 2-3 trees/hectare remain due to the inaccessability of the stands and recent government enforcement.

Investigation and inquiries of sawyers, millers and lumber wholesalers, revealed that while the mahogany had an extremely high market value, Jacaranda, also found in the project area, offered additional attributes to the project.**

---

* Rural Work Committee. Agricultural Life in the Colonies: An Economic Study of 10 Colonies North of Santa Cruz, Bolivia, Methodist Church in Bolivia.

** By GOB law, mahogany cannot be exported in log form. Jacaranda on the other hand can be exported in log form and is heavily sought after by Japanese markets.

It appears that this asset would, in lieu of additional government capital, offer the settlers not only a financial incentive, providing the much needed working capital, but may provide a financial avenue leading toward mechanical clearing, while providing building materials, for housing and fencing as part of the initial settler incentive.

Exploring this latest alternative the USAID Chief Engineer and author interviewed a private entrepreneur (Miller) in Santa Cruz. He appeared quite responsive toward a scheme in which he would provide land clearing during the collection and hauling of mahogany logs, and after milling, back haul the scraps or culled lumber to be used by the seller for the aforementioned buildings and fencing.

At this juncture, it appears dubious as to whether or not provisions for mechanical clearing could encompass the massive clearing required for approximately 400 families per year. There is, however, one additional possibility, that is, a cooperative effort to purchase a D8H crawler tractor (or several) to facilitate a more expeditious clearing pattern. Although the following approach is an aside from the USAID inputs, it warrants discussion.

Presumably, six hectares of cleared land would expedite the overall development pattern. It follows then, that small cooperatives of community origin could purchase tractors for communal use. Given the average community strength of approximately 40 families, it would require 240 has. of cleared land per coop* to satisfy all the inputs.

Accordingly, one D8H crawler tractor could clear approximately 1/2 ha. per day of forested area and about 3/4 ha. per day of the typical scrub area. Assuming a fifty-fifty split or cover the tractor could clear approximately 200 ha.

---

* This input does not necessarily have to be a coop. Perhaps in lieu of credit, INC or a public agency might participate.

per year. A base D8H at Santa Cruz would approach $90,000 (including blade). Expensing the equipment for 7 years, and allowing for 10% maintenance and operation costs, the tractor could clear land (less margin of profit) for approximately $144/has.* At this juncture, it appears appropriate to measure this new alternative to the small farmers.

The foregoing analysis** suggests that the proper choice between these two clearing alternatives must allow for the time discount of money. At present, the GOB discount rate of 10% for like programs effects a reasonable measure in comparing the manual (as in Farm B) vs. mechanical clearing.***

When aligning the two alternatives, the first five years were taken to ascertain the completed 6 has. of clearing operation. For instance, the mechanical clearing would entail the following:

Mechanical Clearing Alternative

Year	ha	Equipment Cost/has(ii)	Other Wages(FL)	Total Costs	Present Worth $e^{-.20t}$	Present Worth $e^{-.30t}$
1	6	864	120	984	806	729
22	0	-0-	120	120	80	66
3	0	-0-	120	120	66	49
4	0	-0-	120	120	54	36
Total	6 ha	864	480	1,344	1,006	880

* $90,000 x 0.10 = $9,000/year O&M (Purchased, FOB Brazil)
Expensed @ 7 yrs.(12%) yields; 90,000 (.21912) = $19,720/year
Total annual cost = $28,720 (@200 ha) = $144/ha.

** Economic Analysis of Agriculture Projects, J. Price Gittinger, IBRD/Economic Development Institute.

*** Discounting the two alternatives by increasing increments suggests that upon reaching a net change in returns between the cash flows that a crossover discount rate will be realized. At this juncture, from an economic standpoint, the decision maker is indifferent to the alternatives. The indicator of 34% crossover discount rate as compared to the 10% cost of capital illustrates the advantage of mechanical clearing.

Manual Clearing

Year	ha	WWages*	Other(FL)	Total Costs	Present Worth $e^{-rt}(.20)$	Present Worth $e^{-rt}(.30)$
1	0.6	-0-	(272)**	-0-	-0-	-0-
2	2.0	737	-0-	737	590	404
3	2.0	737	-0-	737	404	300
4	2.0	737	-0-	737	331	222
	6.0	2,211	(272)	2,211	1,325	926

Subtracting on a year-by-year basis provides an incremental cost stream of the less expensive from the more expensive undiscounted alternative results in a net cost flow which when equated to the discount rate that results in a zero net difference yields the discounted rate of the two equal present worth amounts. Thus:

Crossover Discount Rate

Year	Difference Between Cost Streams	PWA 30%	PW@35%
1	-984	- 729	-693
2	617	339	306
3	617	251	216
4	617	186	152
Total	867	112	-19

Crossover Discount Rate (CDR)

$$CDR = 30 + 5\left(\frac{112}{131}\right) = 34\%$$

---

* The wage for hired labor has been taken as $1.50/day. In light of last years events, i.e., unharvested cotton because of the labor scarcity, and the evident underrated daily wage rate, a shadow wage of $1.20 seems in order to approximate that foregone alternative during the cotton harvest. Adjusting for seasonality, the shadow wage would be 1.10.

** No alternative employment in first 90 days when 0.6 is furnished.

The Transport Model: Net Regional Value Added

In dealing with developmental benefits often associated with feeder roads, the analyst is confronted with two basic issues: "1) Defining the possible barriers or bottlenecks to the development (e.g., economic, political, institutional or socological)* and further defining "the level at which these potential bottlenecks exist: national, regional or local." 2) What is the nature of the changes induced by a feeder road? How do these changes lead to an increase in production?

The first issue has been covered in the CAP quite extensively. It should be noted, however, that feeder roads, and the developmental benefits stemming from these roads do not take into account the increased savings of present road users. What little traffic exists on the present lumber trails is assumed to be negligible and thought to continue over new trails in their search for additional timber. Mixing of the two net benefit streams (i.e., user savings, however little, and development benefits) is not only a difficult task of disaggregation of transportation factors, but runs the risk of doublecounting the direct benefits of development. Clearly, the avoidance of these conflicts are best treated by neglecting existing motor traffic, which is minimal. Assumptions of the transport model are geared toward the aggregation of the small farmers and the increased production induced by the total investment package (i.e., extension services, health, etc.), but for analytical purposes the package is defined under the Program activity of TRANSPORT. Only credit is handled separately to ascertain and develop the given budget constraint.

Interdisciplinary surveys have been accomplished mainly at the local level and were compiled to formulate the various activities within the project area. Stricting addressing the structure of the model, future programs may wish to appraise settlement programs with activities geared toward institutional and sociological consideration. It is also worth mentioning that cottage industries and certain support activities could be included.

---

* Appraisal Methodology for Feeder Road Projects March 19, 1970, aArturo Israel, IBRD, WP 70.

Nonetheless, spin off or supportive industries have not been included in this more general analysis. Nor were the regional commercial farms represented in the activities, because of the unequal mix of commercial to small farms, and the complexity of separating out the various advantages, if any, of the investment packages. While cognizant of the conservative results, the activities were felt to be representative of the characteristics, the region and development based upon the small farmers.

The activities used to describe the project development were based mainly on the production conditions of the activities to be served by the road, the relative prices, restrictions on resources such as labor and animal power, and transport supply conditions both in Truck and Animal Transport.*

The premise for the transport model was based upon a spontaneous settlement representing the "without project" situation compared to the "with project." As mentioned earlier, the project, essentially a quasi-directed program, provides a road network, credit, medical, potable water, and extension services.

Based upon the given constraints, a minimum level of corn, rice, potatoes, and vegetables was incorporated to facilitate the basic consumption requirements. These constraints, later combined with the typical unskilled farm labor, animal power, seasonally hired labor and insecticides, were equated to typical farm activities. The basis of the model utilizes linear programming as the tool in which a maximization of our objective can be easily found. That objective being the value added to the region due to the investment package. During the exercise, it was determined that certain accounting items useful to the overall problem should be incorporated mainly to facilitate an easy accounting system of the various restrictions. Accordingly, accounting items were then combined with the activities and used as the basis for the cost profile of the various crops and cropping pattern. In the "without case," as suggested in the project description, only lumber trails presently exist impeding commercial truck transport while utilizing animal power to the optimum. It

---

* It is interesting to note that the choice of transport mode is always present.

was felt important on the other hand, that the road provide additional choices to the farmer not only in the choice of transport mode for his marketable surplus (e.g., animal or truck) but a whole new array of crops, possibly including perishable, and processible items. The inclusion of perishable crops implies that a derived demand exists between the road and New Lands Development.

Inasmuch as the road makes the area accessible to a large market, it also triggers an additional demand for hired labor to tend extended farmlands. Credit is introduced which exposes the settlers to the program services included in the "with road" test. Accordingly, the extension services and commercial farms will transfer knowledge and techniques to the small farmer especially with regard to use and advantages of fertilizer pesticides and insecticides. Commercial fertilizers, due to the world shortage, were not not considered. Organic and green manure will most likely be used on the small farm complemented by the rotation of crops and the use og legumes which replenish nitrogen in the depleted soils. This approach was considered fundamental to the cropping pattern rather than the intensive use of fertilizers.

The initial tableau (See Exhibits 14, 15) illustrates the basic assumptions utilized in the Linear Programming Model.

Equating the aforementioned activities with the natural constraints to resources produces a maximization of the value added to the region. The net value added between the two alternatives (with and without) is then treated more specifically as the net benefit to the region.

Adding the project costs (algebraically) to the net benefit streams results in the net cash flow, yielding the economic Benefit-Cost Ratio.

As mentioned previously, the present worth of the added consumption on the Altiplano will be incorporated to account for the direct benefit associated with the settlers departure from that area.

The Benefit Cost Analysis

The feasibility of the investment package is supported through the value added by the combination of activities and the interplay of the Altiplano, commercial farms, and Transport mode, and marketing components.

The new value added represents the equivalent uniform annual Benefit which results from the government investment. The initial project costs, along with annual recurrent costs are then compared to the benefits. However, the equivalent uniform annual costs must first be estimated and the time of construction, gestation period, etc., must be considered in the annual benefit stream if the two equivalent uniform annual values are to be comparative.

As illustrated in Exhibits 14 and 15 the "with" and "without" project cases are presented to show the total tableaus of activities and constraints. In figure the newly assigned feeder road is constructed providing an all weather access to the nearest market. The marketing activities must be clearly defined in terms of transport cost of each mode and distance.

Once the New Lands are made accessible by truck, the truckers soon join the regional labor force.*

At this juncture, animal power which is no longer required for transport, shifts into the subsistence agriculture permitting more use of land and labor in that section. For instance, if it previously required one laborer to guide his animal to market, the truck alternative now frees him from that activity adding to the farm labor force. As unskilled labor requirements increase, which have been assigned upper limits, the scarcity of farm land is realized and is treated as such rather than a surplus input. As the farm family develops, resources become more fully utilized, and when credit is introduced, an even greater shift in the productive structure occurs. Also, the marginal returns of various crops are projected identifying the unit value of each incremental investment.

---

* In the general model, the trucking function requires one skilled laborer (the driver) with two unskilled cargo loaders.

Since there is no objective criterion for determining what proportion of the increased value added corresponds to each component in the investment package, it should be clearly understood that all the components contribute together.

Development of the New Lands, described by the model should follow closely to real alternatives within the area. It follows logically, that extension services and training cannot operate without good access. And, further we see a multiplier effect occurring, basically intensified by the road investment.

Technical Inputs

While cognizant of the data requirements for a model such as this, it has been designed and implemented such that simple questionnaires could supply the majority of the activity described. Accordingly, field data, such as the activity Transport Marketing Activity, is described in relative terms of walking time to market and return (i.e., animal hours and man hours); the market price; the loads required to haul annual production and its worth in the market (as differed from the farmgate price); and, the man hours required to achieve that production. The small farmer (our target group) is also well represented through consumption constraints which must be met to feed the farm family. The insurance plot (or garden) is identifiable as agri-subsistence; the basic farm. To illustrate, on page 9, "Agri Sub," the subsistence level activity suggests (reading down the column) that with 910 man hours of unskilled labor and 15 hours of skilled labor on 1 hectare of farm, plus 108 animal hours produces 3600 kgs of vegetables using 165 kgs of insecticides but requiring $8.85 of credit/ha yields a value added to the region, which required $10 of production inputs.

Completion of the run yields a maximum value added for one small farm family. Aggregating the settlement areas then results in the regional value. Subsequently, the value was then placed within the time frame of project development. Quite simply the maximum value was placed as an approximation of the discrete point in time when full development will be realized. At this juncture, simple discounting techniques are applied to further develop a benefit stream which best approximates the likely events, and project objectives.

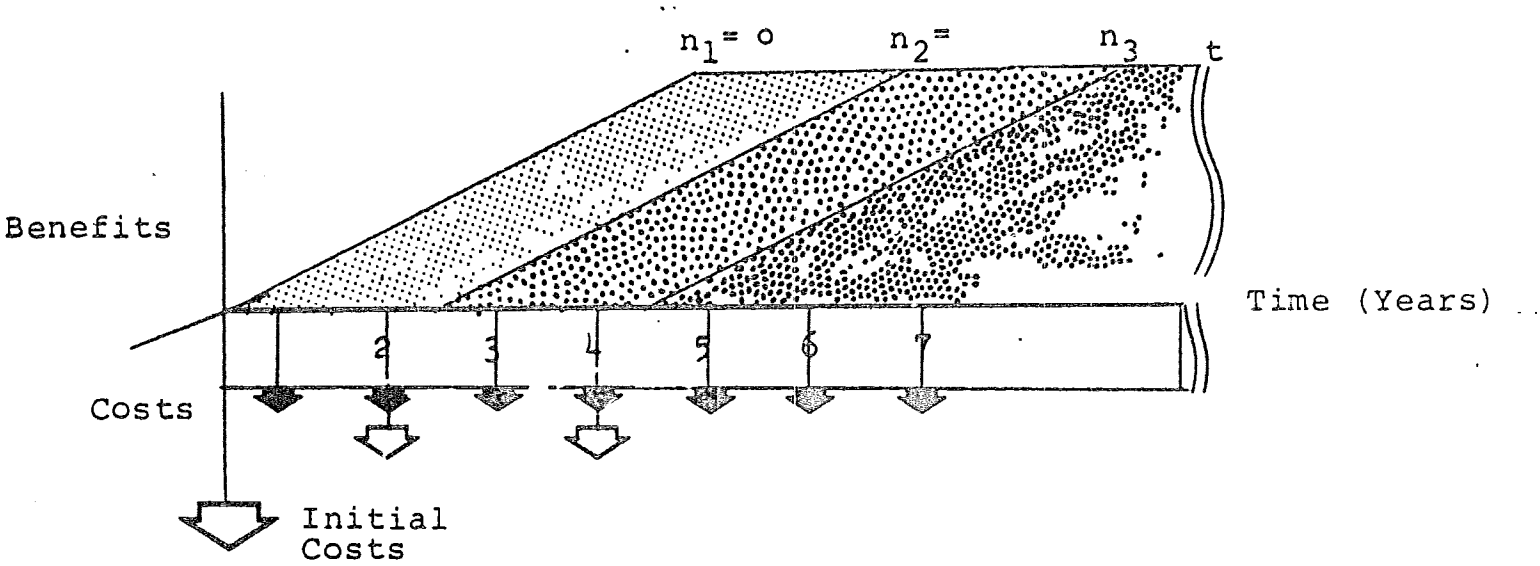
---

* Project Objectives have been designed such that a 65% achievement of the maximum valve added could be attained at year 20.

For instance, in the New Lands scheme nine years would most likely be the timing of full development. For illustrative purposes a linear growth pattern is assumed (exponential growth could also be used).

Then, given a discrete level of benefits at year nine and zero at year one, the linear relationship is tabulated (shown graphically below) and netted against the initial project expenditures and annual recurrent operating or maintenance costs.

In essence the discounted cash flow would appear (as in Table I):



Once the net cash flow is established a Benefit Cost ratio was calculated in the following manner;

$$\sum \text{Benefit Streams (PW)} = G \frac{(1+i)^{n+1}}{i} - (n+1) \frac{G}{i(1+i)^{n}} + A \frac{(1+i)^{tn}-1}{i(1+i)^{t-n}} \frac{1}{(1+i)^{n}}$$

and the summation of the investment package costs, three discrete disbursements over 4 years results in a Benefit Cost Ratio of 2.50 for the New Land development.

Benefits

Opportunity Cost of Capital = 15%

Altiplano

$304,000/yr

$PW_{?} = A(P/A, 15\%, 20)$
$PW_{\circ} = 304,000(6,259) = \$1,902,736$

Chané-Piray (Consolidated Area)

Present returns at $632 net; & 1230 net (with sugar)*

$PW_{cp} = 632\ (P/A, 15\%, 20)$

$PW_{cp} = 632\ (6.259) \times 7000$ families = -27,689,816

Value Added With Road (Incl'd Consumption) = $11,477 Max. Obtainable at year 20

Project Goal: at 0.65 efficiency & social factors= . . .	7460.1
Less "without" road value added	3765.1
Total value added per farm at year 20 . . .	$3695.0

Total Farms = 11,000

Regional output = $45.33/acre.

Value Added at Year 20

$3695.0 x 11,000 farms	$40,645,000
Based upon 3 equal disbursements (A) = ...	$13,548,333

Linear Development Gradient for 20 years

$G = 13,548,333 \div 20 = \$677,416$/year.

Phase I $PW_I = G(P/G, 15\%, 70)$
$677,416\ (33.5822) = \$22,749,142$

* Hernan Zeballos, Director Inc., 1974 Investigative Study; Chané-Piray, Ojitos.

<u>Phase II</u> PW_{II} = 22,749,142 (P/F, 15%,2) = $17,200,626

<u>Phase III</u> PW_{III}= 22,749,142 (P/F, 15%,4) = $13,007,959.

PW, Total Benefits = $PW_o + PW_{CP} + PW_I + PW_{II} + PW_{III}$ = $27,170,647

<u>Costs</u>

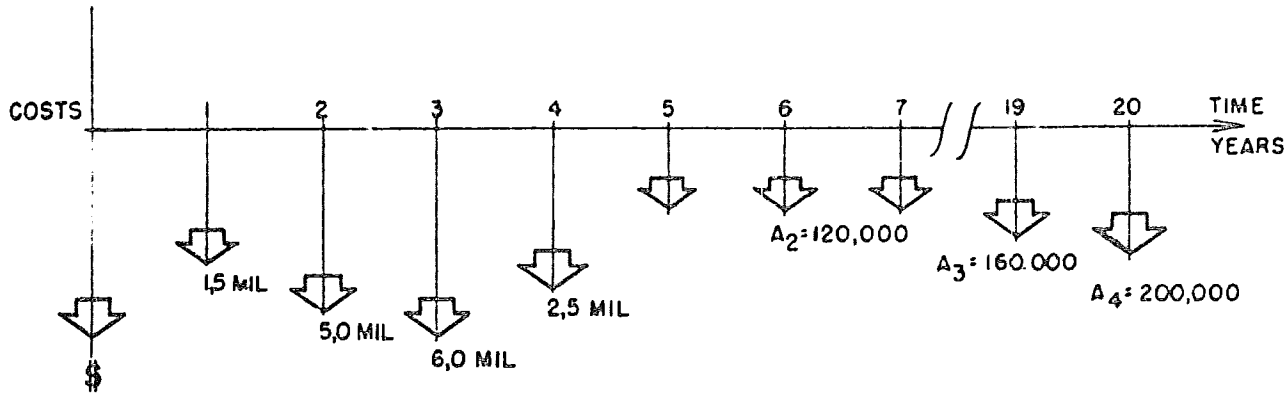
Total Project Cost	=	$15,200,000
Less: Land Resources Study	=	400,000
1/2 vehicle costs	=	50,000
Tech. Assistance (Other Proj.)	=	175,000
Agri.Service Centers (")	=	195,000
Total Costs Attributable to Project		$14,380,000

Project Administration (included)

Project Maintenance

(A_1) year zero-4	$0.0
(A_2) year 4-10	$120,000/year
(A_3) year 10-15	160,000/year
(A_4) year 15-20	200,000/year

<u>Cost Stream Based Upon Critical Path & Engineering Cash Flow</u>



$PW_{Maint} = A_2\ (P/A.,15\%,\ 6)(P/F,15\%,4) = 120{,}000(3.784)(.5718) = 259{,}643$

$A_3\ (P/A_2,15\%,5)\ (P/F,15\%,10) = 160{,}000(3.352)(.2972) = 132{,}578$

$A_3\ (P/A_3,15\%,5)(P/F,\ 15\%,15) = 200{,}000(3.352)(.1229) = 82{,}392$

Total PW Maint $474,613

$P_1 = 1.5$ mil $(P/F,\ 15\%,1) = 1{,}500{,}000(.8696) = \$1{,}304{,}400$

$P_2 = 5.0$ mil $(P/F,\ 15\%,2) = 5{,}000{,}000(.7561) = 3{,}780{,}500$

$P_3 = 6.0$ mil $(P/F,\ 15\%,3) = 6{,}000{,}000(.6575) = 3{,}945{,}000$

$P_4 = 2.4$ mil $(P/F,\ 15\%,4) = 2{,}380{,}000).5718) = 1{,}360{,}884$

Total PW Costs =$10,390,784

$\sum$ Total Discounted Costs = 10,865,397

Benefit/Cost Ratio = $\frac{27{,}170{,}647}{10{,}865{,}397}$ B/C = 2.50

Summary

The average life of the project has been assessed at 20 years. The overall returns to the project due to the various components of the project are presented below:

Returns to farmers labor and management	
Returns to Small Farm A	= 21%
" " " " A2 (15has-with cattle at yr 7)	= 39%
Returns to Small Farm B	= 48%
Returns to Small Farm B2 (15 has.)	= 27%
Returns to Small Farm C (Dairy herd)	= over 50%
Returns to Commercial Farms	
a. Cotton	
b. Cane	
c. Soybeans	= 13%

Returns due to the project as a whole (with Altiplano Benefits)	B/C	= 2.50
Returns due to the project as a whole (without Altiplano Benefits)	B/C	= 2.32

Sensitivity Analysis*

Farm A	Sen # 1 (Reduction of yield by 15%)	= 8% (after consumption)
	Sen # 2 (" of farm size to 15 has.in 10 yrs.)	= 9% (after consumption)
	Sen # 3 (2%-Increase wages,hired labor	= 15% (after consumption)
Farm B	Sen # 1 (Reduction of yield by 15%)	= 25% (after consumption)
	Sen # 2 Increased wages at 20%)	= 43% (after consumption)

* See Exhibits 6 thru 13

EXHIBIT #1

POSSIBLE LAND USE - SAN JULIAN

In Hectares

5 Year Period end of:	Total Ha. Cleared	Rice	Corn	Peanuts or Soybean	Cotton	Cane	Pasture	Cover Crop	Wheat	Timber	House Site
5 years	11	2	2	1	1	-	4	-	-	39	1
10 years	20	3	3	2	2	-	8	(4)	(3)	30	2
15 years	32	4	4	3	3	5	9	(8)	(4)	18	3
20 years	35	4	4	4	4	5	10	(8)	(8)	15	4
25 years	40	5	5	5	5	5	10	(10)	(10)	10	5

1) based on soil types and average colonist output of labor and resources as developed with I.N.C. officials
2) Second crop of wheat could be corn, grain, sorghum or a reduced crop of soybeans
3) Average size of holdings - 50 ha.
4) After first 10 years, hired tractor will be needed

EXHIBIT #2

TOTAL TONS PRODUCED PER HA WITHOUT FERTILIZER ANNUALLY AT THE END OF EACH 5yr. SPAN PER YEAR
(See Exhibit #1)

	Rice	Corn	Peanuts	Cotton	Cane	Pasture	VALUE NOT INCLUDED Second Crops Cover	Wheat	Total Value Total	Total Costs	As per Exhibit Profit Per Yr.
End of: 5 years	2.4	5	2	.50	0	4 aum	-	0	45802-	23,572	22,230
10 years	3.6	7.5	4	1.00	0	8 aum	4	3.6	51,203	26,834	24,369
15 years	4.8	10	6	1.50	300	9 aum	8	4.8	91,600	48,565	43,035
20 years	4.8	10	8	2.00	300	10 aum	8	9.6	118,604	63,889	54,415
25 years	6	12.5	10	2.50	300	10 aum	10-	12.0	141,505	75,685	65,830

TOTAL TONS PRODUCED PER HA. WITH FERTILIZER ANNUALLY

	Rice	Corn	Peanuts	Cotton	Cane	Pasture	Cover	Wheat			
End of : 5 years	4	7.0	3	.75	-	5	-	-			
10 years	6	10.5	6	1.50	-	10	4	6			
15 years	8	14.0	9	2.25	400	12	8	8			
20 years	8	14.0	12	3.00	400	14	8	16			
25 years	10	17.5	15	3.75	400	14	10	20			

Crop value costs and profits include all direct costs of production. All labor including family procided 20 pesos/day cost does not include clearing but not costs of land.

EXHIBIT # 3

WINTER CROP 2 YEARS COVER OR----WHEAT, GRAIN SORGHUM, SOYBEANS OR CORN

25 years from now a possible rotation at agr. dev. level - 20 years after settlement

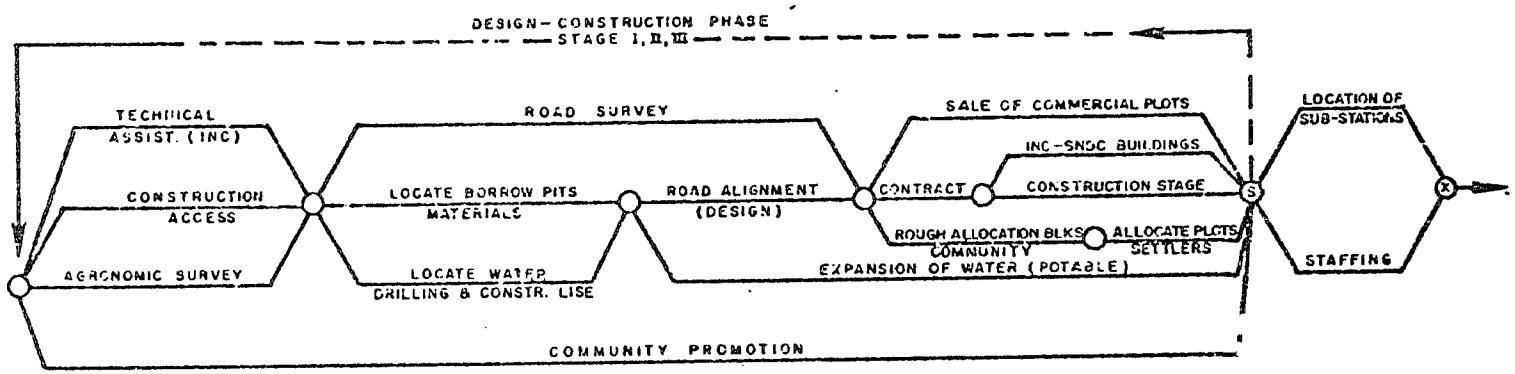
1994	1995	1996	1997	1998	1999	2000	2001	2002	200
Rice Lab-Lab	Cotton Soybean or Wheat	Corn Cover	Peanut Wheat	C A N E	C A N E	C A N E	C A N E	Rice Cover	Cotton Grain
Peanut Wheat	Rice Cover	Cotton Wheat or Grain Sorg	Corn Cover	Peanut Wheat	Rice Cover	Cotton Grain Sorg.	Corn Cover	Peanut Wheat	Rice Cover
Corn Lab-Lab	Peanut Wheat	Rice Cover	Cotton Soybean or Grain Sorg.	Corn Cover	Peanut Wheat	Rice Cover	Cotton Grain Sorg.	Corn Cover	Peanut Wheat
Cotton Grain Sorg. or Wheat	Corn Cover	Peanut Wheat	Rice Cover	Cotton Grain Sorg.	Corn Cover	Peanut Wheat	Rice Cover	Cotton Grain Sorg.	Corn Cover
C A N E	C A N E	C A N E	C A N E	Rice Cover	Cotton Grain Sorg.	Corn Cover	Peanut Wheat	C A N E	C A N E

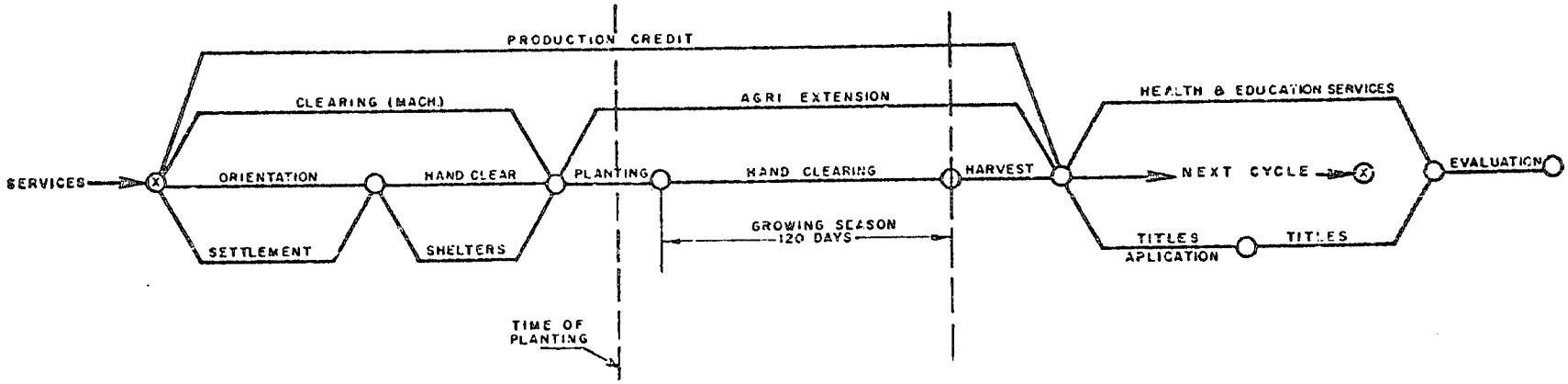
25 Ha. total - divided into 5 ha. fields
Top - summer or "main" crop
Bottom - Winter or Second Crop
Cover crop - Lab-Lab

2nd Crop after peanuts and cotton could be soybeans would have a reduced yield thus putting all four crops at close to the same levels of net profit.

ACTIVITIES

1.- PROMOTION
2.- LAND PARCEL (SURVEY)
3.- (SETTLER) ROUGH ALLOCATION (COMMUNITY)
4.- TITLE
5.- CONSTRUCTION ACCES
6.- LOCATE BORROW PITS & MATERIALS
7.- WATER (LOCATION & DRILLING)
8.- ALIGN AGRONOMIC SURVEY
9.- ROAD ALIGNMENT
10.- CONSTRUCTION (STAGE I) CONTRACT
11.- CONSTRUCTION OF HEALTH POSTS & SUB-STATION
12.- CLEARING LAND
13.- STATTING OF HEALTH POSTS
14.- EXPANSION OF WATER (POTABLE)
15.- SETTLER ALLOCATION
16.- ORIENTATION
17.- AQ. EXTENSION
18.- CREDIT FACILITIES
19.- TECH. ASSISTANCE TO INC
20.- ADVIT ED. CENTER





NEW LANDS SETTLEMENT

(NOT TO SCALE)

(FOR CONCEPTUAL PURPOSES ONLY)

AGENCY FOR INTERNATIONAL DEVELOPM...
FINANCIAL ANALYSIS

DATE: 4/23/74

FARM TYPE C

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: (33 HECTARE)										
GARDEN	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
RICE	1.00	1.50	1.50	1.50	1.50	2.00	2.00	2.00	3.00	3.00
CORN	0.0	0.0	1.50	1.50	1.50	2.00	2.00	2.00	3.00	3.00
PASTURE (CATTLE)	0.0	0.0	1.00	2.50	4.00	4.50	6.00	7.50	7.50	9.50
TOTAL LAND IN USE	1.50	2.00	4.50	6.00	7.50	9.00	10.50	12.00	14.00	16.00
YIELD: (TONS/HECTARE)										
VEGETABLES	1.80	1.70	1.50	1.50	1.50	1.50	1.50	1.50	1.20	1.50
RICE	0.0	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
CORN	0.0	0.0	0.0	1.60	1.60	1.60	1.60	1.60	1.60	1.60
CATTLE (KGS)	167.00	167.00	427.00	542.00	594.00	1458.00	1458.00	1458.00	1458.00	1458.00
OUTPUT: (TONS)										
VEGETABLES	0.90	0.85	0.75	0.75	0.75	0.75	0.75	0.75	0.60	0.75
RICE	0.0	1.80	1.80	1.80	1.80	2.40	2.40	2.40	3.60	3.60
CORN	0.0	0.0	0.0	2.40	2.40	3.20	3.20	3.20	4.80	4.80
CATTLE (KGS)	0.0	0.0	427.00	1355.00	2176.00	6561.00	8748.00	10935.00	10935.00	13851.00
SEED REQUIREMENT 4%: (TONS)										
VEGETABLES	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.03
RICE	0.0	0.07	0.07	0.07	0.07	0.10	0.10	0.10	0.14	0.14
CORN	0.0	0.0	0.0	0.10	0.10	0.13	0.13	0.13	0.19	0.19
ON FARM LOSSES 5%: (TONS)										
VEGETABLES	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.04
RICE	0.0	0.09	0.09	0.09	0.09	0.12	0.12	0.12	0.18	0.18
CORN	0.0	0.0	0.0	0.12	0.12	0.16	0.16	0.16	0.24	0.24
HOME CONSUMPTION: (TONS)										
VEGETABLES	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57
RICE	0.0	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
CORN	0.0	0.0	0.0	0.64	0.64	0.64	0.64	0.64	0.64	0.64
MEAT (CATTLE) (KGS)	0.0	150.00	150.00	150.00	200.00	200.00	250.00	300.00	300.00	300.00
NET PRODUCTION: (TONS)										
VEGETABLES	0.25	0.21	0.11	0.11	0.11	0.11	0.11	0.11	-0.02	0.11
RICE	0.0	0.77	0.77	0.77	0.77	1.32	1.32	1.32	2.41	2.41
CORN	0.0	0.0	0.0	1.55	1.55	2.27	2.27	2.27	3.73	3.73
CATTLE (KGS)	0.0	-150.00	277.00	1205.00	2176.00	6361.00	8498.00	10635.00	10635.00	13551.00

AGENCY FOR INTERNATIONAL DEVELOPMENT
FINANCIAL ANALYSIS

DATE: 4/23/74

FARM TYPE C

FARM BUDGET W/PROJECT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 1
SALES: (FARMGATE)										
VEGETABLES										
@$ 200.00/TON ($)	50.20	41.10	22.90	22.90	22.90	22.90	22.90	22.90	-4.40	22.9
RICE										
@$ 140.00/TON ($)	0.0	108.22	108.22	108.22	108.22	184.66	184.66	184.66	337.54	337.5
CORN										
@$ 75.00/TON ($)	0.0	0.0	0.0	116.02	116.02	170.62	170.62	170.62	279.82	279.8
CATTLE										
@$ 0.96/KG ($)	0.0	-144.00	265.92	1156.80	2088.96	6106.56	8158.08	10209.60	10209.60	13008.9
GROSS SALES ($)	50.20	5.32	397.04	1403.94	2336.10	6484.74	8536.26	10587.78	10822.56	13649.2
EXPENDITURES:										
FARM LABOR ($)	(68.00)	(90.00)	(158.00)	(158.00)	(158.00)	(203.00)	(203.00)	(203.00)	(203.00)	(203.0
FARM HAND CLEARING ($)	(50.00)	(0.0)	(0.0)	(0.0)	(30.00)	(135.00)	(203.00)	(225.00)	(382.00)	(405.0
FENCING ($)	0.0	0.0	0.0	130.00	130.00	0.0	0.0	140.00	140.00	140.0
FINEFALS&MEDICINES ($)	0.0	0.0	50.00	100.00	100.00	250.00	250.00	250.00	250.00	250.0
HIRED LABOR CLEAR. ($)	0.0	0.0	0.0	0.0	0.0	130.00	225.00	350.00	350.00	350.0
HIRED LABOR PROD. ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PECH CLEARING@$375/HA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL EXPENDITURES ($)	0.0	0.0	50.00	230.00	230.00	380.00	475.00	740.00	740.00	740.0
TOTAL (MAN-DAYS)	79.	60.	105.	105.	125.	312.	421.	519.	623.	639.
ADJ. CASH INCOME & EXP.										
CASH OUTLAY ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOAN-PROD. CREDIT ($)	350.00	150.00	150.00	150.00	150.00	0.0	0.0	0.0	0.0	0.0
LOAN REPAYMENT 10% ($)	-385.00	-165.00	-165.00	-165.00	-165.00	0.0	0.0	0.0	0.0	0.0
INTER. CREDIT 20% ($)	0.0	0.0	144.52	-55.48	-55.48	-55.48	-55.48	-55.48	-55.48	0.0
PURCHASE CATTLE ($)	-300.00	0.0	-200.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FARM FAMILY NET REV. ($)	-284.80	-9.68	276.55	1103.46	2035.62	6049.25	8005.77	9792.29	10027.5	12909.2
FARM RET.-LABOR/MGMT ($)	-402.80	-99.68	118.55	945.46	1847.62	5711.25	7599.77	9364.29	9442.07	12301.2

AGENCY FOR INTERNATIONAL DEVELOPMENT
ECONOMIC ANALYSIS

DATE: 4/23/74

FARM TYPE C

ELEMENT BENEFIT W/PROJ	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
LOAN ELEMENT ($)	-335.00	-15.00	-70.48	-70.48	-70.48	-55.48	-55.48	-55.48	-55.48	0.0
SALVAGE VALUE ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NET ECONOMIC REVENUE ($)	-619.80	-24.68	206.07	1032.97	1965.13	5993.77	7950.29	9736.80	9971.58	12909.[illegible]
NON-CASH COST:										
VALUE OF SUBSIDIES ($)	-250.00	-250.00	-250.00	-250.00	-250.00	0.0	0.0	0.0	0.0	0.0
FAMILY LABOR ($)	118.00	90.00	158.00	158.00	188.00	338.00	406.00	428.00	585.00	608.00
WAGE LABOR ($)	0.0	0.0	0.0	0.0	0.0	130.00	225.00	350.00	350.00	350.00
NET BENEFIT 33 REC. ($)	-751.80	-184.68	114.07	940.97	1903.13	6461.77	8581.29	10514.80	10906.58	13867.22

BEEF CATTLE HERD DEVELOPMENT PROJECTIONS
MODEL FOR USE IN FARM TYPE C - LIVESTOCK 10 HAS.

	END OF RANCH YEAR									
	1	2	3	4	5	6	7	8	9	10
Herd Composition (No.)										
1. Bulls	-	-	-	-	-	-	-	-	-	-
2. Breeding Cows	1	-	1	1	11	2	2	2	2	2
3. Calves (Total)	-	2	3	5	7	9	9	9	9	9
4. Heifers (Born)	1	-	1	2	1	2	2	2	2	2
5. Heifers	-	-	-	-	-	-	-	-	-	-
6. Steers (Born)	-	1	1	1	2	2	2	2	2	2
7. Steers	-	-	-	-	-	-	-	-	-	-
8. Cull Cows	-	-	-	-	-	-	-	-	-	-
9. Total animals	2	3	5	7	9	9	9	9	9	9
0. Total animal units	-	-	-	-	-	-	-	-	-	-
1. Total animal carrying capacity	9	9	9	9	9	9	9	9	9	9
eaths (No.)										
2. Bulls	-	-	-	-	-	-	-	-	-	-
3. Milking Cows	-	-	-	-	-	-	-	-	-	-
4. Heifers (9-24 Months)	-	-	1	1	1	2	2	2	2	2
5. Cull Cows	-	-	-	-	-	-	-	-	-	-
Total (Deaths)	-	-	1	1	1	2	2	2	2	2
rchases (No.)										
5. Bulls	-	-	-	-	-	-	-	-	-	-
7. Heifers (24-36 mos.)	1	-	1	-	-	-	-	-	-	-
Total	-	-	-	-	-	-	-	-	-	-

BEEF CATTLE HERD DEVELOPMENT PROJECTIONS
MODEL FOR USE IN FARM TYPE C - LIVESTOCK 10 HAS.

	END OF RANCH YEAR									
	1	2	3	4	5	6	7	8	9	10
Sales (No.)										
18. Cull Bulls	-	-	-	1	-	1	1	1	1	1
19. Heifers (24-36 mos.)	-	-	-	-	-	-	-	-	-	-
20. Heifers (More than 36 mos.)	-	-	-	-	-	-	-	-	-	-
21. Steers (24-36 mos.)	-	-	1	-	1	2	2	2	2	2
22. Steers (More than 36 36 mos.)	-	-	-	-	-	-	-	-	-	-
23. Cull Cows	-	-	-	-	-	1	1	1	1	1
Total (at end of year)	-	-	1	1	4	4	4	4	4	4
Total Dairy Cows Producing	1	1	2	3	3	5	5	5	5	5
Total Liters @2,000	2,000	2,000	4,000	6,000	6,000	15,000	15,000	15,000	15,000	15,00[illegible]
Total Sales	160	160	320	480	480	1,200	1,200	1,200	1,200	1,[illegible]
Cow Purchase = $180										
Male Calf Sold = $40										
Steer Sold = $90										
Cow Sold = $80										
Yield = 2,000[1]/yr/cow @$0.08/l										
Additional Sales	-	-	90	40	90	200	200	200	200	200
Total Sales	160	160	410	520	570	1,400	1,400	1,400	1,400	1,40[illegible]

AGENCY FOR INTERNATIONAL DEVELOPMENT
FINANCIAL ANALYSIS

DATE: 4/23/74 FARM TYPE A- #2 PAGE 1

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: (33 HECTARE)										
GARDEN	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
RICE	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
CORN	0.0	0.0	0.0	1.00	2.00	3.00	4.00	4.00	4.00	4.00
POTATOES	0.0	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.00	4.00	4.00
WHEAT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	[illegible]
PASTURE (CATTLE)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	3.00	[illegible]
TOTAL LAND IN USE	0.60	2.80	2.80	3.80	4.80	5.80	6.80	11.80	13.80	15.80
YIELD: (TONS/HECTARE)										
VEGETABLES	1.80	1.70	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
RICE	0.0	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
CORN	0.0	0.0	0.0	1.60	1.60	1.60	1.60	1.60	1.60	1.60
POTATOES	0.0	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	1.20	1.20	1.20	1.20
WHEAT	0.0	0.0	0.0	1.10	1.10	1.10	1.10	1.10	1.10	1.10
CATTLE (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	500.00	500.00	500.00
OUTPUT: (TONS)										
VEGETABLES	1.08	1.02	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
RICE	0.0	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40
CORN	0.0	0.0	0.0	1.60	3.20	4.80	6.40	6.40	6.40	6.40
POTATOES	0.0	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.80	4.80	[illegible]
WHEAT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	[illegible]
CATTLE (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	500.00	1500.00	2500.00
SEED REQUIREMENT 4%: (TONS)										
VEGETABLES	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
RICE	0.0	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
CORN	0.0	0.0	0.0	0.06	0.13	0.19	0.26	0.26	0.26	0.26
POTATOES	0.0	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.19	0.19	0.19
WHEAT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ON FARM LOSSES 5%: (TONS)										
VEGETABLES	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
RICE	0.0	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
CORN	0.0	0.0	0.0	0.08	0.16	0.24	0.32	0.32	0.32	0.32
POTATOES	0.0	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.24	0.24	0.24
WHEAT	0.0	0.0	0.0	0.0	0.0	[illegible]	0.0	0.0	0.0	0.0

AGENCY FOR INTERNATIONAL DEVELOPME
FINANCIAL ANALYSIS

DATE: 4/23/74 FARM TYPE A- #2

FARM BUDGET W/PROJECT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
HOME CONSUMPTION: (TONS)										
VEGETABLES	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57
RICE	0.0	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
CORN	0.0	0.0	0.0	0.64	0.64	0.64	0.64	0.64	0.64	0.64
POTATOES	0.0	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
MEAT (CATTLE) (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.00	91.00
NET PRODUCTION: (TONS)										
VEGETABLES	0.41	0.36	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
RICE	0.0	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32
CORN	0.0	0.0	0.0	0.82	2.27	3.73	5.19	5.19	5.19	5.19
POTATOES	0.0	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.37	4.37	4.37
WHEAT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CATTLE (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	500.00	1409.00	2409.00
SALES: (FARMGATE)										
VEGETABLES @$ 200.00/TON ($)	82.96	72.04	50.20	50.20	50.20	50.20	50.20	50.20	50.20	50.20
RICE @$ 140.00/TON ($)	0.0	184.66	184.66	184.66	184.66	184.66	184.66	184.66	184.66	184.66
CORN @$ 75.00/TON ($)	0.0	0.0	0.0	61.42	170.62	279.82	389.02	389.02	389.02	389.02
POTATOES @$ 140.00/TON ($)	0.0	52.50	52.50	52.50	52.50	52.50	52.50	52.50	52.50	52.50
SOYBEANS @$ 180.00/TON ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	786.24	786.24	786.24
WHEAT @$ 100.00/TON ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
CATTLE @$ 0.90/KG ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	450.00	1268.10	2168.10
GROSS SALES ($)	82.96	309.20	287.36	348.78	457.98	567.18	676.38	1912.62	2730.72	3630.72
EXPENDITURES:										
FARM LABOR (%)	(96.00)	(96.00)	(96.00)	(96.00)	(96.00)	(96.00)	(96.00)	(96.00)	(100.00)	(100.00)
FARM HAND CLEARING ($)	(247.00)	(190.00)	(190.00)	(190.00)	(190.00)	(190.00)	(190.00)	(190.00)	(190.00)	(190.00)
FENCING ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	130.00	130.00
MINERALS&MEDECINES ($)	0.0	0.0	50.00	100.00	100.00	100.00	100.00	100.00	250.00	250.00
HIRED LABOR CLEAR. ($)	350.00	375.00	375.00	375.00	0.0	0.0	140.00	150.00	350.00	380.00
HIRED LABOR PROD. ($)	0.0	0.0	0.0	0.0		40.00	40.00	80.00	110.00	150.00
MECH CLEARING@$375/HA	0.0				0.0	0.0	0.0	0.0	0.0	0.0
TOTAL EXPENDITURES ($)	350.00	375.00	425.00	475.00	100.00	140.00	280.00	340.00	840.00	910.00
TOTAL (MAN-DAYS)	462.	441.	441.	317.	257.	264.	584.	611.	753.	800.

AGENCY FOR INTERNATIONAL DEVELOPMENT
FINANCIAL ANALYSIS

DATE: 4/23/74

FARM TYPE A- #2

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.										
CASH OUTLAY ($)	-125.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOAN-PROD. CREDIT ($)		150.00	150.00	150.00	150.00	200.00	200.00	250.00	300.00	300.00
LOAN REPAYMENT 10%($)		-165.00	-165.00	-165.00	-165.00	-220.00	-220.00	-275.00	-330.00	-330.00
INTER. CREDIT 20% ($)	0.0								0.0	0
PURCHASE CATTLE ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-500.00	0.0
FARM FAMILY NET REV.($)	-392.04	-80.80	-152.64	-141.22	-89.83	-407.18	-376.38	1547.62	1360.72	2690.72

Year	Net Cash Flow	PW 30%		PW 40%	
1	- 392.04	.7692	- 301.56	.7143	- 280
2	- 80.80	.5917	- 47.80	.5102	- 41.22
3	- 152.64	.4552	- 69.48	.3644	- 55.62
4	- 141.22	.3501	- 49.44	.2603	- 36.76
5	89.83	.2693	24.19	.1859	16.70
6	407.18	.2072	84 37	.1328	54.07
7	376.38	.1594	59.99	.0949	35.71
8	1,547.62	.1226	189.74	.0678	104.92
9	1,360.72	.0943	128.31	.0484	65 86
10	2,690.72	.0725	195 08	0346	93.10
			930.8		- 44

$$\text{Rate of Return} = \frac{930}{977}(.10) = 39.5\%$$

ENCY FOR INTERNATIONAL DEVELOPME
FINANCIAL ANALYSIS

DATE: 4/23/74 FARM TYPE B- #2 PAGE 1

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: (33 HECTARE)										
GARDEN	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
RICE	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
CORN	0.0	0.0	0.0	1.00	2.00	3.00	4.00	4.00	4.00	4.00
POTATOES	0.0	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.00	4.00	4.00
WHEAT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
PASTURE (CATTLE)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	3.00	5
TOTAL LAND IN USE	0.60	2.80	2.80	3.80	4.80	5.80	6.80	11.80	13.80	15.80
YIELD: (TONS/HECTARE)										
VEGETABLES	1.80	1.70	1.50	1.50	1.50	1.50	1.50	1.50	1.20	1.50
RICE	0.0	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
CORN	0.0	0.0	0.0	1.60	1.60	1.60	1.60	1.60	1.60	1.60
POTATOES	0.0	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	1.20	1.20	1.20	1.20
WHEAT	0.0	0.0	0.0	1.10	1.10	1.10	1.10	1.10	1.10	1.10
CATTLE (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	500.00	500.00	500.00
OUTPUT: (TONS)										
VEGETABLES	1.08	1.02	0.90	0.90	0.90	0.90	0.90	0.90	0.72	0.90
RICE	0.0	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40
CORN	0.0	0.0	0.0	1.60	3.20	4.80	6.40	6.40	6.40	6.40
POTATOES	0.0	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.80	4.80	4.80
WHEAT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.
CATTLE (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	500.00	1500.00	2500.00
SEED REQUIREMENT 4%: (TONS)										
VEGETABLES	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.04
RICE	0.0	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
CORN	0.0	0.0	0.0	0.06	0.13	0.19	0.26	0.26	0.26	0.26
POTATOES	0.0	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.19	0.19	0.19
WHEAT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ON FARM LOSSES 5%: (TONS)										
VEGETABLES	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
RICE	0.0	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
CORN	0.0	0.0	0.0	0.08	0.16	0.24	0.32	0.32	0.32	0.32
POTATOES	0.0	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.24	0.24	0.24
WHEAT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

UNCLASSIFIED

AGENCY FOR INTERNATIONAL DEVELOPMENT
FINANCIAL ANALYSIS

DATE: 4/23/74 FARM TYPE B- #2 PAGE 3

FARM BUDGET W/PROJECT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
HOME CONSUMPTION: (TONS)										
VEGETABLES	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57
RICE	0.0	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
CORN	0.0	0.0	0.0	0.64	0.64	0.64	0.64	0.64	0.64	0.64
POTATOES	0.0	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
MEAT (CATTLE) (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
NET PRODUCTION: (TONS)										
VEGETABLES	0.41	0.36	0.25	0.25	0.25	0.25	0.25	0.25	0.09	0.25
RICE	0.0	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32
CORN	0.0	0.0	0.0	0.82	2.27	3.73	5.19	5.19	5.19	5.19
POTATOES	0.0	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.37	4.37	4.37
WHEAT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CATTLE (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
SALES: (FARMGATE)										
VEGETABLES @$ 200.00/TON ($)	82.96	72.04	50.20	50.20	50.20	50.20	50.20	50.20	17.44	50.20
RICE @$ 140.00/TON ($)	0.0	184.66	184.66	184.66	184.66	184.66	184.66	184.66	184.66	184.66
CORN @$ 75.00/TON ($)	0.0	0.0	0.0	61.42	170.62	279.82	389.02	389.02	389.02	389.02
POTATOES @$ 140.00/TON ($)	0.0	52.50	52.50	52.50	52.50	52.50	52.50	52.50	52.50	52.50
SOYBEANS @$ 180.00/TON ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	786.24	786.24	786.2[illegible]
WHEAT @$ 100.00/TON ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CATTLE @$ 0.90/KG ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
GROSS SALES ($)	82.96	309.20	287.36	348.78	457.98	567.18	676.38	1462.62	1429.86	1462.62
EXPENDITURES:										
FARM LABOR ($)	(50.00)	(50.00)	(50.00)	(50.00)	(50.00)	(50.00)	(50.00)	(50.00)	(100.00)	(100.00)
FARM HAND CLEARING ($)	(247.00)	(190.00)	(190.00)	(190.00)	(150.00)	(190.00)	(190.00)	(190.00)	(190.00)	(190.00)
FENCING ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	130.00	130.00
MINERALS&MEDECINES ($)	0.0	50.0	50.00	100.00	100.00	100.00	100.00	100.00	250.00	250.00
HIRED LABOR CLEAR. ($)	400.0	300.00	180.00	150.00	100.00	200.00	400.00	400.00	350.00	150.00
HIRED LABOR PROD. ($)	0.0	0.0	0.0	0.0	50.00	50.00	150.00	240.00	240.00	300.00
MECH CLEARING@$375/HA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL EXPENDITURES ($)	400.0	350.00	180.00	250.00	250.00	350.00	650.00	740.00	970.00	830.00

AGENCY FOR INTERNATIONAL DEVELOPMENT
FINANCIAL ANALYSIS

DATE: 4/23/74 FARM TYPE B- #2 PAGE 5

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.										
CASH OUTLAY (%)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOAN-PROD. CREDIT ($)	350.00	150.00	150.00	150.00	150.00	150.00	200.00	250.00	250.00	300
LOAN REPAYMENT 10% ($)	-385.00	-165.00	-165.00	-165.00	-165.00	-165.00	-220.00	-275.00	-275.00	-330.00
INTER. CREDIT 20% ($)										
PURCHASE CATTLE ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-500.00	0.0
FARM RET.-LABOR/MGMT ($)	-352.04	-155.80	92.36	83.78	192.98	203.18	106.38	434.86	434.86	602.62

F A R M B 2

Year	Net Cash Flow	30%		25%	
1	- 352	.7692	- 271	.800	- 282
2	- 156	.5917	- 92	.640	- 100
3	92	.4552	42	.512	47
4	84	.3501	29	.4096	34
5	193	.2693	52	.3277	63
6	203	.2072	42	.2621	53
7	106	.1594	17	.2097	22
8	434	.1226	53	.1678	73
9	434	.0943	41	.1342	58
10	602	.0725	44	.1074	65
			- 43		33

$$\text{Rate of Return} = 25 + \frac{33}{76}(5) = 27\%$$

AGENCY FOR INTERNATIONAL DEVELOPMENT
FINANCIAL ANALYSIS

DATE: 4/23/74

FARM TYPE A-SENSITIVITY #1

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: (33 HECTARE)										
GARDEN	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
RICE	0.0	2.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
CORN	0.0	0.0	0.0	1.00	3.00	5.00	5.00	5.00	5.00	5.00
POTATOES	0.0	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	2.00	4.00	5.00	5.00
WHEAT	0.0	0.0	0.0	1.00	3.00	5.00	5.00	5.00	5.00	5.00
PASTURE (CATTLE)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	3.00	5.00
TOTAL LAND IN USE	0.60	2.80	4.80	7.80	11.80	15.80	17.80	20.80	23.80	25.
YIELD: (TONS/HECTARE)										
VEGETABLES	1.80	1.70	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
RICE	0.0	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
CORN	0.0	0.0	0.0	1.60	1.60	1.60	1.60	1.60	1.60	1.60
POTATOES	0.0	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	1.20	1.20	1.20	1.20
WHEAT	0.0	0.0	0.0	1.10	1.10	1.10	1.10	1.10	1.10	1.10
CATTLE (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	500.00	500.00	500.00
OUTPUT: (TONS)										
VEGETABLES	1.08	1.02	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
RICE	0.0	2.40	4.80	6.00	6.00	6.00	6.00	6.00	6.00	6.00
CORN	0.0	0.0	0.0	1.60	4.80	8.00	8.00	8.00	8.00	8.00
POTATOES	0.0	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	2.40	4.80	6.00	6.00
WHEAT	0.0	0.0	0.0	1.10	3.30	5.50	5.50	5.50	5.50	5.50
CATTLE (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	500.00	1500.00	2500.00
SEED REQUIREMENT 4%: (TONS)										
VEGETABLES	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
RICE	0.0	0.10	0.19	0.24	0.24	0.24	0.24	0.24	0.24	0.24
CORN	0.0	0.0	0.0	0.06	0.19	0.32	0.32	0.32	0.32	0.32
POTATOES	0.0	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	0.10	0.19	0.24	0.24
WHEAT	0.0	0.0	0.0	0.04	0.13	0.22	0.22	0.22	0.22	0.22
ON FARM LOSSES 5%: (TONS)										
VEGETABLES	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
RICE	0.0	0.12	0.24	0.30	0.30	0.30	0.30	0.30	0.30	0.30
CORN	0.0	0.0	0.0	0.08	0.24	0.40	0.40	0.40	0.40	0.40
POTATOES	0.0	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	0.12	0.24	0.30	0.30
WHEAT	0.0	0.0	0	0.05	0.16	0.	0.27	0.27	0.27	0.27

ICY FOR INTERNATIONAL DEVELOPMEN
FINANCIAL ANALYSIS

DATE: 4/23/74

FARM TYPE A-SENSITIVITY #1

FARM BUDGET W/PROJECT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
HOME CONSUMPTION: (TONS)										
VEGETABLES	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57
RICE	0.0	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
CORN	0.0	0.0	0.0	0.64	0.64	0.64	0.64	0.64	0.64	0.64
POTATOES	0.0	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
MEAT (CATTLE) (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.00	91.00
NET PRODUCTION: (TONS)										
VEGETABLES	0.41	0.36	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.[illegible]
RICE	0.0	1.32	3.50	4.59	4.59	4.59	4.59	4.59	4.59	4.[illegible]
CORN	0.0	0.0	0.0	0.82	3.73	6.64	6.64	6.64	6.64	6.64
POTATOES	0.0	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	2.18	4.37	5.46	5.46
WHEAT	0.0	0.0	0.0	1.00	3.00	5.00	5.00	5.00	5.00	5.00
CATTLE (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	500.00	1409.00	2409.00
SALES: (FARMGATE)										
VEGETABLES @$ 174.00/TON ($)	72.17	62.67	43.67	43.67	43.67	43.67	43.67	43.67	43.67	43.67
RICE @$ 122.00/TON ($)	0.0	160.92	427.37	560.59	560.59	560.59	560.59	560.59	560.59	560.59
CORN @$ 65.00/TON ($)	0.0	0.0	0.0	53.23	242.51	431.79	431.79	431.79	431.79	431.79
POTATOES @$ 122.00/TON ($)	0.0	45.75	45.75	45.75	45.75	45.75	45.75	45.75	45.75	45.75
SOYBEANS @$ 157.00/TON ($)	0.0	0.0	0.0	0.0	0.0	0.0	342.89	685.78	857.22	857.22
WHEAT @$ 87.00/TON ($)	0.0	0.0	0.0	87.09	261.26	435.43	435.43	435.43	435.43	435.[illegible]
CATTLE @$ 0.78/KG ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	390.00	1099.02	1879.02
GROSS SALES ($)	72.17	269.34	516.79	790.33	1153.79	1517.24	1860.13	2593.02	3473.48	4253.48
EXPENDITURES:										
FARM LABOR ($)	(96.00)	(96.00)	(96.00)	(96.00)	(96.00)	(96.00)	(96.00)	(96.00)	(100.00)	(100.00)
FARM HAND CLEARING ($)	(247.00)	(190.00)	(190.00)	(190.00)	(190.00)	(190.00)	(190.00)	(190.00)	(190.00)	(190.00)
FENCING ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	130.00	130.00
MINERALS&MEDECINES ($)	0.0	0.0	50.00	100.00	100.00	100.00	100.00	100.00	250.00	250.00
HIRED LABOR CLEAR. ($)	350.00	375.00	375.00	375.00	0.0	0.0	140.00	150.00	350.00	380.00
HIRED LABOR PROD. ($)	0.0	0.0	0.0	0.0	180.00	360.00	450.00	480.00	540.00	540.00
MECH CLEARING@$375/HA	0.0	750.00	750.00	375.00	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL EXPENDITURES ($)	350.00	1125.00	1175.00	850.00	280.00	460.00	690.00	730.00	1270.00	1300.00
TOTAL (MAN-DAYS)	462.	441.	441.	441.	311.	431.	584.	611.	787.	807.

AGENCY FOR INTERNATIONAL DEVELOPMENT
FINANCIAL ANALYSIS

DATE: 4/23/74

FARM TYPE A-SENSITIVITY #1

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.										
CASH OUTLAY ($)	-250.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOAN-PROD. CREDIT ($)	350.00	150.00	150.00	150.00	150.00	200.00	200.00	250.00	300.00	300.00
LOAN REPAYMENT 10% ($)	-385.00	-165.00	-165.00	-165.00	-165.00	-220.00	-220.00	-275.00	-330.00	-330.00
INTER. CREDIT 20% ($)	0.0	1083.86	-416.14	-416.14	-416.14	-416.14	-416.14	-416.14	0.0	0.0
PURCHASE CATTLE ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-500.00	0.0
FARM FAMILY NET REV. ($)	-562.82	213.21	-1089.35	-490.80	442.65	621.11	733.99	1421.88	1673.48	2923.48
FARM RET.-LABOR/MGMT ($)	-905.82	-72.79	-1375.35	-776.80	156.65	335.11	447.99	1135.88	1383.48	2633.48

YR	NET CASH FLOW	DISCOUNT RATE0.05	DISCOUNTED CASH FLOW	DISCOUNT RATE0.10	DISCOUNTED CASH FLOW
1.	-905.82	1.0500	-862.69	1.1000	-823.47
2.	-72.79	1.1025	-66.02	1.2100	-60.16
3.	-1375.35	1.1576	-1188.08	1.3310	-1033.32
4.	-776.80	1.2155	-639.08	1.4641	-530.57
5.	156.65	1.2763	122.74	1.6105	97.27
6.	335.11	1.3401	250.07	1.7716	189.16
7.	447.99	1.4071	318.38	1.9487	229.89
8.	35.88	1.4774	24.29	2.1436	16.74
9.	1083.48	1.5513	891.81	2.3579	586.74
10.	2633.48	1.6289	1616.74	2.5937	1015.33
		PW1=	468.16	PW2=	-312.40

THE RATE OF RETURN IS 8.00%

AGENCY FOR INTERNATIONAL DEVELOPMENT
FINANCIAL ANALYSIS

DATE: 4/23/74

FARM TYPE A-SENSITIVITY #3

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: (33 HECTARE)										
GARDEN	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
RICE	0.0	2.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
CORN	0.0	0.0	0.0	1.00	3.00	5.00	5.00	5.00	5.00	5.00
POTATOES	0.0	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	2.00	4.00	5.00	5.00
WHEAT	0.0	0.0	0.0	1.00	3.00	5.00	5.00	5.00	5.00	[illegible]
PASTURE (CATTLE)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	3.00	[illegible]
TOTAL LAND IN USE	0.60	2.80	4.80	7.80	11.80	15.80	17.80	20.80	23.80	25.80
YIELD: (TONS/HECTARE)										
VEGETABLES	1.80	1.70	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
RICE	0.0	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
CORN	0.0	0.0	0.0	1.60	1.60	1.60	1.60	1.60	1.60	1.60
POTATOES	0.0	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	1.20	1.20	1.20	1.20
WHEAT	0.0	0.0	0.0	1.10	1.10	1.10	1.10	1.10	1.10	1.10
CATTLE (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	500.00	500.00	500.00
OUTPUT: (TONS)										
VEGETABLES	1.08	1.02	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
RICE	0.0	2.40	4.80	6.00	6.00	6.00	6.00	6.00	6.00	6.00
CORN	0.0	0.0	0.0	1.60	4.80	8.00	8.00	8.00	8.00	8.00
POTATOES	0.0	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	2.40	4.80	6.00	[illegible]
WHEAT	0.0	0.0	0.0	1.10	3.30	5.50	5.50	5.50	5.50	[illegible]
CATTLE (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	500.00	1500.00	2500.00
SEED REQUIREMENT 4%: (TONS)										
VEGETABLES	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
RICE	0.0	0.10	0.19	0.24	0.24	0.24	0.24	0.24	0.24	0.24
CORN	0.0	0.0	0.0	0.06	0.19	0.32	0.32	0.32	0.32	0.32
POTATOES	0.0	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	[illegible]
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	0.10	0.19	0.24	0.24
WHEAT	0.0	0.0	0.0	0.04	0.13	0.22	0.22	0.22	0.22	0.22
ON FARM LOSSES 5%: (TONS)										
VEGETABLES	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
RICE	0.0	0.12	0.24	0.30	0.30	0.30	0.30	0.30	0.30	0.30
CORN	0.0	0.0	0.0	0.08	0.24	0.40	0.40	0.40	0.40	0.40
POTATOES	0.0	0.03	0.03	0.03	0.03	[illegible]	0.03	0.03	0.03	0.03
SOYBEANS	0.0	0.0	[illegible]	0.0	0.0	[illegible]	0.12	0.24	0.30	0.30
WHEAT	0.0	0.0	0	0.05	0.16	[illegible]	0.27	0.27	0.27	0.27

AGENCY FOR INTERNATIONAL DEVELOPMENT
FINANCIAL ANALYSIS

DATE: 4/23/74 FARM TYPE A-SENSITIVITY #3 PAGE 3

FARM BUDGET W/PROJECT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
HOME CONSUMPTION: (TONS)										
VEGETABLES	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57
RICE	0.0	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
CORN	0.0	0.0	0.0	0.64	0.64	0.64	0.64	0.64	0.64	0.64
POTATOES	0.0	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
MEAT (CATTLE) (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.00	91.00
NET PRODUCTION: (TONS)										
VEGETABLES	0.41	0.36	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
RICE	0.0	1.32	3.50	4.59	4.59	4.59	4.59	4.59	4.59	4.59
CORN	0.0	0.0	0.0	0.82	3.73	6.64	6.64	6.64	6.64	6.64
POTATOES	0.0	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	2.18	4.37	5.46	5.46
WHEAT	0.0	0.0	0.0	1.00	3.00	5.00	5.00	5.00	5.00	5.00
CATTLE (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	500.00	1409.00	2409.00
SALES: (FARMGATE)										
VEGETABLES @$ 200.00/TON ($)	82.96	72.04	50.20	50.20	50.20	50.20	50.20	50.20	50.20	50.20
RICE @$ 140.00/TON ($)	0.0	184.66	490.42	643.30	643.30	643.30	643.30	643.30	643.30	643.30
CORN @$ 75.00/TON ($)	0.0	0.0	0.0	61.42	279.82	498.22	498.22	498.22	498.22	498.22
POTATOES @$ 140.00/TON ($)	0.0	52.50	52.50	52.50	52.50	52.50	52.50	52.50	52.50	52.50
SOYBEANS @$ 180.00/TON ($)	0.0	0.0	0.0	0.0	0.0	0.0	393.12	786.24	982.80	982.80
WHEAT @$ 100.00/TON ($)	0.0	0.0	0.0	100.10	300.30	500.50	500.50	500.50	500.50	500.50
CATTLE @$ 0.90/KG ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	450.00	1268.10	2168.10
GROSS SALES ($)	82.96	309.20	593.12	907.52	1326.12	1744.72	2137.84	2980.96	3995.62	4895.62
EXPENDITURES:										
FARM LABOR ($)	(96.00)	(96.00)	(96.00)	(96.00)	(96.00)	(96.00)	(96.00)	(96.00)	(100.00)	(100.00)
FARM HAND CLEARING ($)	(247.00)	(190.00)	(190.00)	(190.00)	(190.00)	(190.00)	(190.00)	(190.00)	(190.00)	(190.00)
FENCING ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	130.00	130.00
MINERALS&MEDECINES ($)	0.0	0.0	50.00	100.00	100.00	100.00	100.00	100.00	250.00	250.00
HIRED LABOR CLEAR. ($)	350.00	375.00	375.00	375.00	0.0	0.0	140.00	150.00	350.00	380.00
HIRED LABOR PROD. ($)	0.0	0.0	0.0	0.0	234.00	468.00	585.00	624.00	702.00	702.00
MECH CLEARING@$375/HA	0.0	750.00	750.00	375.00	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL EXPENDITURES ($)	350.00	1125.00	1175.00	850.00	334.00	568.00	825.00	874.00	1432.00	1462.00

AGENCY FOR INTERNATIONAL DEVELOPMENT
FINANCIAL ANALYSIS

DATE: 4/23/74

FARM TYPE A-SENSITIVITY #3

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.										
CASH OUTLAY ($)	-250.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	[illegible]
LOAN-PROD. CREDIT ($)	350.00	150.00	150.00	150.00	150.00	200.00	200.00	250.00	300.00	300.00
LOAN REPAYMENT 10% ($)	-385.00	-165.00	-165.00	-165.00	-165.00	-220.00	-220.00	-275.00	-330.00	-330.00
INTER. CREDIT 20% ($)	0.0	1083.86	-416.14	-416.14	-416.14	-416.14	-416.14	-416.14	0.0	0.0
PURCHASE CATTLE ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-500.00	0.0
FARM FAMILY NET REV. ($)	-552.04	253.06	-1013.02	-373.61	560.99	740.59	876.71	1665.83	2033.62	3403.62
FARM RET.-LABOR/MGMT ($)	-895.04	-32.94	-1299.02	-659.61	274.99	454.59	590.71	1379.83	1743.62	3113.62

YR	NET CASH FLOW	DISCOUNT RATE0.25	DISCOUNTED CASH FLOW	DISCOUNT RATE0.30	DISCOUNTED CASH FLOW
1.	-895.04	1.2500	-716.03	1.3000	-688.49
2.	-32.94	1.5625	-21.08	1.6900	-19.49
3.	-1294.02	1.9531	-665.10	2.1970	-591.27
4.	659.61	2.4414	270.18	2.8561	230.95
5.	274.99	3.0518	90.11	3.7129	74.06
6.	454.59	3.8147	119.17	4.8268	94.18
7.	590.71	4.7684	123.88	6.2748	94.14
8.	1379.83	5.9605	231.50	8.1573	169.15
9.	1743.62	7.4506	234.02	10.6044	164.42
10.	3113.62	9.3132	334.32	13.7857	225.86
		PW1=	0.97	PW2=	-246.49

THE RATE OF RETURN IS 25.02%

AGENCY FOR INTERNATIONAL DEVELOPMENT
FINANCIAL ANALYSIS

DATE: 4/23/74

FARM TYPE B-SENSITIVITY #1

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: (33 HECTARE)										
GARDEN	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
RICE	0.0	2.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
CORN	0.0	0.0	0.0	1.00	3.00	5.00	5.00	5.00	5.00	5.00
POTATOES	0.0	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	2.00	4.00	5.00	5.00
WHEAT	0.0	0.0	0.0	1.00	3.00	5.00	5.00	5.00	5.00	5.00
PASTURE (CATTLE)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	3.00	5.00
TOTAL LAND IN USE	0.60	2.80	4.80	7.80	11.80	15.80	17.80	20.80	23.80	25.80
YIELD: (TONS/HECTARE)										
VEGETABLES	1.80	1.70	1.50	1.50	1.50	1.50	1.50	1.50	1.20	1.50
RICE	0.0	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
CORN	0.0	0.0	0.0	1.60	1.60	1.60	1.60	1.60	1.60	1.60
POTATOES	0.0	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	1.20	1.20	1.20	1.20
WHEAT	0.0	0.0	0.0	1.10	1.10	1.10	1.10	1.10	1.10	1.10
CATTLE (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	500.00	500.00	500.00
OUTPUT: (TONS)										
VEGETABLES	1.08	1.02	0.90	0.90	0.90	0.90	0.90	0.90	0.72	0.90
RICE	0.0	2.40	4.80	6.00	6.00	6.00	6.00	6.00	6.00	6.00
CORN	0.0	0.0	0.0	1.60	4.80	8.00	8.00	8.00	8.00	8.00
POTATOES	0.0	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	2.40	4.80	6.00	6.00
WHEAT	0.0	0.0	0.0	1.10	3.30	5.50	5.50	5.50	5.50	5.50
CATTLE (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	500.00	1500.00	2500.00
FEED REQUIREMENT 4%: (TONS)										
VEGETABLES	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.04
RICE	0.0	0.10	0.19	0.24	0.24	0.24	0.24	0.24	0.24	0.24
CORN	0.0	0.0	0.0	0.06	0.19	0.32	0.32	0.32	0.32	0.32
POTATOES	0.0	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	0.10	0.19	0.24	0.24
WHEAT	0.0	0.0	0.0	0.04	0.13	0.22	0.22	0.22	0.22	0.22
ON FARM LOSSES 5%: (TONS)										
VEGETABLES	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
RICE	0.0	0.12	0.24	0.30	0.30	0.30	0.30	0.30	0.30	0.30
CORN	0.0	0.0	0.0	0.08	0.24	0.40	0.40	0.40	0.40	0.40
POTATOES	0.0	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
SOYBEANS	0.0	0.0	0	0.0	0.0	0.0	0.12	0.24	0.30	0.30
WHEAT	0.0	0.0	0	0.05	0.16	0.27	0.27	0.27	0.27	0.27

AGENCY FOR INTERNATIONAL DEVELOPMENT
FINANCIAL ANALYSIS

DATE: 4/23/74

FARM TYPE B-SENSITIVITY #1

FARM BUDGET W/PROJECT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
HOME CONSUMPTION: (TONS)										
VEGETABLES	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57
RICE	0.0	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
CORN	0.0	0.0	0.0	0.64	0.64	0.64	0.64	0.64	0.64	0.64
POTATOES	0.0	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
MEAT (CATTLE) (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.00	9[illegible]0
NET PRODUCTION: (TONS)										
VEGETABLES	0.41	0.36	0.25	0.25	0.25	0.25	0.25	0.25	0.09	0.25
RICE	0.0	1.32	3.50	4.59	4.59	4.59	4.59	4.59	4.59	4.59
CORN	0.0	0.0	0.0	0.82	3.73	6.64	6.64	6.64	6.64	6.64
POTATOES	0.0	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	2.18	4.37	5.46	5.46
WHEAT	0.0	0.0	0.0	1.00	3.00	5.00	5.00	5.00	5.00	5.00
CATTLE (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	500.00	1409.00	2409.00
SALES: (FARMGATE)										
VEGETABLES @$ 174.00/TON ($)	72.17	62.67	43.67	43.67	43.67	43.67	43.67	43.67	15.17	43.67
RICE @$ 122.00/TON ($)	0.0	160.92	427.37	560.59	560.59	560.59	560.59	560.59	560.59	560.59
CORN @$ 65.00/TON ($)	0.0	0.0	0.0	53.23	242.51	431.79	431.79	431.79	431.79	431.79
POTATOES @$ 122.00/TON ($)	0.0	45.75	45.75	45.75	45.75	45.75	45.75	45.75	45.75	45.[illegible]
SOYBEANS @$ 157.00/TON ($)	0.0	0.0	0.0	0.0	0.0	0.0	342.89	685.78	857.22	857.22
WHEAT @$ 87.00/TON ($)	0.0	0.0	0.0	87.09	261.26	435.43	435.43	435.43	435.43	435.43
CATTLE @$ 0.78/KG ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	390.00	1099.02	1879.02
GROSS SALES ($)	72.17	269.34	516.79	790.33	1153.79	1517.24	1860.13	2593.02	3444.98	4253.48
EXPENDITURES:										
FARM LABOR ($)	(50.00)	(50.00)	(50.00)	(50.00)	(50.00)	(50.00)	(50.00)	(50.00)	(100.00)	(100.00)
FARM HAND CLEARING ($)	(247.00)	(190.00)	(190.00)	(190.00)	(150.00)	(190.00)	(190.00)	(190.00)	(190.00)	(190.00)
FENCING ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	130.00	130.00
MINERALS&MEDECINES ($)	0.0	0.0	50.00	100.00	100.00	100.00	100.00	100.00	250.00	250.00
HIRED LABOR CLEAR. ($)	0.0	300.00	480.00	450.00	450.00	450.00	300.00	300.00	350.00	150.00
HIRED LABOR PROD. ($)	0.0	0.0	0.0	0.0	180.00	360.00	450.00	480.00	540.00	540.00
MECH CLEARING@$375/HA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL EXPENDITURES ($)	0.0	300.00	530.00	550.00	730.00	910.00	850.00	880.00	1270.00	1070.00

AGENCY FOR INTERNATIONAL DEVELOPMENT
FINANCIAL ANALYSIS

DATE: 4/23/74

FARM TYPE B-SENSITIVITY #1

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.										
CASH OUTLAY ($)	-150.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOAN-PROD. CREDIT ($)	350.00	150.00	150.00	150.00	150.00	150.00	200.00	250.00	250.00	300.00
LOAN REPAYMENT 10% ($)	-385.00	-165.00	-165.00	-165.00	-165.00	-165.00	-220.00	-275.00	-275.00	-330.00
INTER. CREDIT 20% ($)	0.0	361.29	-138.71	-138.71	-138.71	-138.71	-138.71	-138.71	0.0	0.0
PURCHASE CATTLE ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-500.00	0.0
FARM FAMILY NET REV. ($)	-112.82	315.63	-166.92	86.62	270.08	453.53	851.42	1549.31	1649.98	3153.48
FARM RET.-LABOR/MGMT ($)	-409.82	75.63	-406.92	-153.38	70.08	213.53	611.42	1309.31	1359.98	2863.48

NCY FOR INTERNATIONAL DEVELOPME
FINANCIAL ANALYSIS

DATE: 4/23/74

FARM TYPE B-SENSITIVITY #3

PAGE

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: (33 HECTARE)										
GARDEN	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
RICE	0.0	2.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
CORN	0.0	0.0	0.0	1.00	3.00	5.00	5.00	5.00	5.00	5.00
POTATOES	0.0	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	2.00	4.00	5.00	5.00
WHEAT	0.0	0.0	0.0	1.00	3.00	5.00	5.00	5.00	5.00	5.00
PASTURE (CATTLE)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	3.00	[illegible]0
TOTAL LAND IN USE	0.60	2.80	4.80	7.80	11.80	15.80	17.80	20.80	23.80	25.80
YIELD: (TONS/HECTARE)										
VEGETABLES	1.80	1.70	1.50	1.50	1.50	1.50	1.50	1.50	1.20	1.50
RICE	0.0	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
CORN	0.0	0.0	0.0	1.60	1.60	1.60	1.60	1.60	1.60	1.60
POTATOES	0.0	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	1.20	1.20	1.20	1.20
WHEAT	0.0	0.0	0.0	1.10	1.10	1.10	1.10	1.10	1.10	1.10
CATTLE (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	500.00	500.00	500.00
OUTPUT: (TONS)										
VEGETABLES	1.08	1.02	0.90	0.90	0.90	0.90	0.90	0.90	0.72	0.90
RICE	0.0	2.40	4.80	6.00	6.00	6.00	6.00	6.00	6.00	6.00
CORN	0.0	0.0	0.0	1.60	4.80	8.00	8.00	8.00	8.00	8.00
POTATOES	0.0	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	2.40	4.80	6.00	6.00
WHEAT	0.0	0.0	0.0	1.10	3.30	5.50	5.50	5.50	5.50	5.[illegible]
CATTLE (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	500.00	1500.00	2500.[illegible]0
SEED REQUIREMENT 4%: (TONS)										
VEGETABLES	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.04
RICE	0.0	0.10	0.19	0.24	0.24	0.24	0.24	0.24	0.24	0.24
CORN	0.0	0.0	0.0	0.06	0.19	0.32	0.32	0.32	0.32	0.32
POTATOES	0.0	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	0.10	0.19	0.24	0.24
WHEAT	0.0	0.0	0.0	0.04	0.13	0.22	0.22	0.22	0.22	0.22
ON FARM LOSSES 5%: (TONS)										
VEGETABLES	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
RICE	0.0	0.12	0.24	0.30	0.30	0.30	0.30	0.30	0.30	0.30
CORN	0.0	0.0	0.0	0.08	0.24	0.40	0.40	0.40	0.40	0.40
POTATOES	0.0	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	0.12	0.24	0.30	0.30
WHEAT	0.0	0.0	0.0	0.05	0.16	0.27	0.27	0.27	0.27	0.27

AGENCY FOR INTERNATIONAL DEVELOPMENT
FINANCIAL ANALYSIS

DATE: 4/23/74

FARM TYPE B-SENSITIVITY #3

FARM BUDGET W/PROJECT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
HOME CONSUMPTION: (TONS)										
VEGETABLES	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57
RICE	0.0	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
CORN	0.0	0.0	0.0	0.64	0.64	0.64	0.64	0.64	0.64	0.64
POTATOES	0.0	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
MEAT (CATTLE) (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.00	91.00
NET PRODUCTION: (TONS)										
VEGETABLES	0.41	0.36	0.25	0.25	0.25	0.25	0.25	0.25	0.09	0.25
RICE	0.0	1.32	3.50	4.59	4.59	4.59	4.59	4.59	4.59	4.59
CORN	0.0	0.0	0.0	0.82	3.73	6.64	6.64	6.64	6.64	6.64
POTATOES	0.0	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
SOYBEANS	0.0	0.0	0.0	0.0	0.0	0.0	2.18	4.37	5.46	5.46
WHEAT	0.0	0.0	0.0	1.00	3.00	5.00	5.00	5.00	5.00	5.00
CATTLE (KGS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	500.00	1409.00	2409.00
SALES: (FARMGATE)										
VEGETABLES @$ 200.00/TON ($)	82.96	72.04	50.20	50.20	50.20	50.20	50.20	50.20	17.44	50.20
RICE @$ 140.00/TON ($)	0.0	184.66	490.42	643.30	643.30	643.30	643.30	643.30	643.30	643.30
CORN @$ 75.00/TON ($)	0.0	0.0	0.0	61.42	279.82	498.22	498.22	498.22	498.22	498.22
POTATOES @$ 140.00/TON ($)	0.0	52.50	52.50	52.50	52.50	52.50	52.50	52.50	52.50	52.50
SOYBEANS @$ 180.00/TON ($)	0.0	0.0	0.0	0.0	0.0	0.0	393.12	786.24	982.80	982.
WHEAT @$ 100.00/TON ($)	0.0	0.0	0.0	100.10	300.30	500.50	500.50	500.50	500.50	500.50
CATTLE @$ 0.90/KG ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	450.00	1268.10	2168.10
GROSS SALES ($)	82.96	309.20	593.12	907.52	1326.12	1744.72	2137.84	2980.96	3962.86	4895.62
EXPENDITURES:										
FARM LABOR ($)	(50.00)	(50.00)	(50.00)	(50.00)	(50.00)	(50.00)	(50.00)	(50.00)	(100.00)	(100.00)
FARM HAND CLEARING ($)	(247.00)	(190.00)	(190.00)	(190.00)	(150.00)	(190.00)	(190.00)	(190.00)	(190.00)	(190.00)
FENCING ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	130.00	130.00
MINERALS&MEDECINES ($)	0.0	0.0	50.00	100.00	100.00	100.00	100.00	100.00	250.00	250.00
HIRED LABOR CLEAR. ($)	0.0	300.00	480.00	450.00	450.00	450.00	300.00	300.00	350.00	150.00
HIRED LABOR PROD. ($)	0.0	0.0	0.0	0.0	234.00	468.00	585.00	624.00	702.00	702.00
MECH CLEARING@$375/HA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL EXPENDITURES ($)	0.0	300.00	5 0	550.00	784.00	1018.	985.00	1024.00	1432.00	1232.00

AGENCY FOR INTERNATIONAL DEVELOPMENT
FINANCIAL ANALYSIS

DATE: 4/23/74 FARM TYPE B-SENSITIVITY WJ

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.										
CASH OUTLAY ($)	-150.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOAN-PROD. CREDIT ($)	350.00	150.00	150.00	150.00	150.00	150.00	200.00	250.00	250.00	300.00
LOAN REPAYMENT 10% ($)	-385.00	-165.00	-165.00	-165.00	-165.00	-165.00	-220.00	-275.00	-275.00	-330.00
INTER. CREDIT 20% ($)	0.0	361.29	-138.71	-138.71	-138.71	-138.71	-138.71	-138.71	0.0	0.0
PURCHASE CATTLE ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-500.00	0.0
FARM FAMILY NET REV. ($)	-102.04	355.49	-90.59	203.81	388.41	573.01	994.13	1793.25	2005.86	3633.62
FARM RET.-LABOR/MGMT ($)	-399.04	115.49	-330.59	-36.19	188.41	333.01	754.13	1553.25	1715.86	3343.62

AGENCY FOR INTERNATIONAL DEVELOPMENT
FINANCIAL ANALYSIS

DATE: 4/23/74

FARM TYPE C-SENSITIVITY #1

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: (33 HECTARE)										
GARDEN	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
RICE	1.00	1.50	1.50	1.50	1.50	2.00	2.00	2.00	3.00	3.00
CORN	0.0	0.0	1.50	1.50	1.50	2.00	2.00	2.00	3.00	3.00
PASTURE (CATTLE)	0.0	0.0	1.00	2.50	4.00	4.50	6.00	7.50	7.50	9.50
TOTAL LAND IN USE	1.50	2.00	4.50	6.00	7.50	9.00	10.50	12.00	14.00	16 [illegible]
YIELD: (TONS/HECTARE)										
VEGETABLES	1.80	1.70	1.50	1.50	1.50	1.50	1.50	1.50	1.20	1.50
RICE	0.0	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
CORN	0.0	0.0	0.0	1.60	1.60	1.60	1.60	1.60	1.60	1.60
CATTLE (KGS)	167.00	167.00	427.00	542.00	594.00	1458.00	1458.00	1458.00	1458.00	1458.00
OUTPUT: (TONS)										
VEGETABLES	0.90	0.85	0.75	0.75	0.75	0.75	0.75	0.75	0.60	0.75
RICE	0.0	1.80	1.80	1.80	1.80	2.40	2.40	2.40	3.60	3.60
CORN	0.0	0.0	0.0	2.40	2.40	3.20	3.20	3.20	4.80	4.80
CATTLE (KGS)	0.0	0.0	427.00	1355.00	2376.00	6561.00	8748.00	10935.00	10935.00	13851.00
SEED REQUIREMENT 4%: (TONS)										
VEGETABLES	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.03
RICE	0.0	0.07	0.07	0.07	0.07	0.10	0.10	0.10	0.14	0.14
CORN	0.0	0.0	0.0	0.10	0.10	0.13	0.13	0.13	0.19	0.19
ON FARM LOSSES 5%: (TONS)										
VEGETABLES	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.04
RICE	0.0	0.09	0.09	0.09	0.09	0.12	0.12	0.12	0.18	0.18
CORN	0.0	0.0	0.0	0.12	0.12	0.16	0.16	0.16	0.24	0.24
HOME CONSUMPTION: (TONS)										
VEGETABLES	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.5[illegible]
RICE	0.0	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
CORN	0.0	0.0	0.0	0.64	0.64	0.64	0.64	0.64	0.64	0.64
MEAT (CATTLE) (KGS)	0.0	150.00	150.00	150.00	200.00	200.00	250.00	300.00	300.00	300.00
NET PRODUCTION: (TONS)										
VEGETABLES	0.25	0.21	0.11	0.11	0.11	0.11	0.11	0.11	-0.02	0.11
RICE	0.0	0.77	0.77	0.77	0.77	1.32	1.32	1.32	2.41	2.41
CORN	0.0	0.0	0.0	1.55	1.55	2.27	2.27	2.27	3.73	3.73
CATTLE (KGS)	0.0	-150.00	2[illegible]0	1205.00	2176.00	6361[illegible]	8498.00	10635.00	10635.00	13551.00

AGENCY FOR INTERNATIONAL DEVELOPMENT
FINANCIAL ANALYSIS

DATE: 4/23/74 FARM TYPE C-SENSITIVITY #1 PAGE 3

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)										
VEGETABLES										
@$ 174.00/TON ($)	43.67	35.76	19.92	19.92	19.92	19.92	19.92	19.92	-3.83	19.92
RICE										
@$ 122.00/TON ($)	0.0	94.31	94.31	94.31	94.31	160.92	160.92	160.92	294.14	29[illegible]4
CORN										
@$ 65.00/TON ($)	0.0	0.0	0.0	100.55	100.55	147.87	147.87	147.87	242.51	242.51
CATTLE										
@$ 0.78/KG ($)	0.0	-117.00	216.06	939.90	1697.28	4961.58	6628.44	8295.30	8295.30	10569.78
GROSS SALES ($)	43.67	13.06	330.29	1154.58	1912.06	5290.29	6957.15	8624.01	8828.13	11126.36
EXPENDITURES:										
FARM LABOR ($)	(68.00)	(90.00)	(158.00)	(158.00)	(158.00)	(203.00)	(203.00)	(203.00)	(203.00)	(203.00
FARM HAND CLEARING ($)	(50.00)	(0.0)	(0.0)	(0.0)	(30.00)	(135.00)	(203.00)	(225.00)	(382.00)	(405.00
FENCING ($)	0.0	0.0	0.0	130.00	130.00	0.0	0.0	140.00	140.00	140.00
MINERALS&MEDECINES ($)	0.0	0.0	50.00	100.00	100.00	250.00	250.00	250.00	250.00	250.00
HIRED LABOR CLEAR. ($)	0.0	0.0	0.0	0.0	0.0	130.00	225.00	350.00	350.00	350.00
HIRED LABOR PROD. ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MECH CLEARING@$375/HA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL EXPENDITURES ($)	0.0	0.0	50.00	230.00	230.00	380.00	475.00	740.00	740.00	740.00
TOTAL (MAN-DAYS)	79.	60.	105.	105.	125.	312.	421.	519.	623.	639.
ADD. CASH INCOME & EXP.										
CASH OUTLAY ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOAN-PROD. CREDIT ($)	350.00	150.00	150.00	150.00	150.00	0.0	0.0	0.0	0.0	0.0
LOAN REPAYMENT 10% ($)	-385.00	-165.00	-165.00	-165.00	-165.00	0.0	0.0	0.0	0.0	0.0
INTER. CREDIT 20% ($)	0.0	0.0	144.52	-55.48	-55.48	-55.48	-55.48	-55.48	-55.48	0.0
PURCHASE CATTLE ($)	-300.00	0.0	-200.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FARM FAMILY NET REV. ($)	-291.33	-1.94	209.80	854.20	1611.58	4854.80	6426.66	7828.52	8032.64	10386.3[illegible]
FARM RET.-LABOR/MGMT ($)	-409.33	-91.94	51.80	696.20	1423.58	4516.80	6020.66	7400.52	7447.64	9778.3[illegible]

AGENCY FOR INTERNATIONAL DEVELOPMENT
FINANCIAL ANALYSIS

DATE: 4/23/74

FARM TYPE C-SENSITIVITY #2

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: (33 HECTARE)										
GARDEN	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
RICE	1.00	1.50	1.50	1.50	1.50	2.00	2.00	2.00	3.00	3.00
CORN	0.0	0.0	1.50	1.50	1.50	2.00	2.00	2.00	3.00	3.00
PASTURE (CATTLE)	0.0	0.0	1.00	2.50	4.00	4.50	6.00	7.50	7.50	9.50
TOTAL LAND IN USE	1.50	2.00	4.50	6.00	7.50	9.00	10.50	12.00	14.00	16.00
YIELD: (TONS/HECTARE)										
VEGETABLES	1.80	1.70	1.50	1.50	1.50	1.50	1.50	1.50	1.20	1.50
RICE	0.0	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
CORN	0.0	0.0	0.0	1.60	1.60	1.60	1.60	1.60	1.60	1.60
CATTLE (KGS)	139.00	139.00	356.00	452.00	495.00	1215.00	1215.00	1215.00	1215.00	1215.00
OUTPUT: (TONS)										
VEGETABLES	0.90	0.85	0.75	0.75	0.75	0.75	0.75	0.75	0.60	0.75
RICE	0.0	1.80	1.80	1.80	1.80	2.40	2.40	2.40	3.60	3.60
CORN	0.0	0.0	0.0	2.40	2.40	3.20	3.20	3.20	4.80	4.80
CATTLE (KGS)	0.0	0.0	356.00	1130.00	1980.00	5467.50	7290.00	9112.50	9112.50	11542.50
SEED REQUIREMENT 4%: (TONS)										
VEGETABLES	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.03
RICE	0.0	0.07	0.07	0.07	0.07	0.10	0.10	0.10	0.14	0.14
CORN	0.0	0.0	0.0	0.10	0.10	0.13	0.13	0.13	0.19	0.[illegible]
ON FARM LOSSES 5%: (TONS)										
VEGETABLES	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.04
RICE	0.0	0.09	0.09	0.09	0.09	0.12	0.12	0.12	0.18	0.18
CORN	0.0	0.0	0.0	0.12	0.12	0.16	0.16	0.16	0.24	0.24
HOME CONSUMPTION: (TONS)										
VEGETABLES	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57
RICE	0.0	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
CORN	0.0	0.0	0.0	0.64	0.64	0.64	0.64	0.64	0.64	0.64
MEAT (CATTLE) (KGS)	0.0	150.00	150.00	150.00	200.00	200.00	250.00	300.00	300.00	300.00
NET PRODUCTION: (TONS)										
VEGETABLES	0.25	0.21	0.11	0.11	0.11	0.11	0.11	0.11	-0.02	0.11
RICE	0.0	0.77	0.77	0.77	0.77	1.32	1.32	1.32	2.41	2.41
CORN	0.0	0.0	[illegible]	1.55	1.55	2.[illegible]	2.27	2.27	3.73	3.73
CATTLE (KGS)	0.0	-150.00	20[illegible]	980.00	1780.00	5267.[illegible]	7040.00	8812.50	8812.50	11242.50

AGENCY FOR INTERNATIONAL DEVELOPMENT
FINANCIAL ANALYSIS

DATE: 4/23/74

FARM TYPE C-SENSITIVITY #2

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)										
VEGETABLES @$ 200.00/TON ($)	50.20	41.10	22.90	22.90	22.90	22.90	22.90	22.90	-4.40	22.90
RICE @$ 140.00/TON ($)	0.0	108.22	108.22	108.22	108.22	184.66	184.66	184.66	337.54	33[illegible]
CORN @$ 75.00/TON ($)	0.0	0.0	0.0	116.02	116.02	170.62	170.62	170.62	279.82	279.82
CATTLE @$ 0.96/KG ($)	0.0	-144.00	197.76	940.80	1708.80	5056.80	6758.40	8460.00	8460.00	10792.80
GROSS SALES ($)	50.20	5.32	328.88	1187.94	1955.94	5434.98	7136.58	8838.18	9072.96	11433.06
EXPENDITURES:										
FARM LABOR ($)	(68.00)	(90.00)	(158.00)	(158.00)	(158.00)	(203.00)	(203.00)	(203.00)	(203.00)	(203.00)
FARM HAND CLEARING ($)	(50.00)	(0.0)	(0.0)	(0.0)	(30.00)	(135.00)	(203.00)	(225.00)	(382.00)	(405.00)
FENCING ($)	0.0	0.0	0.0	130.00	130.00	0.0	0.0	140.00	140.00	140.00
MINERALS&MEDECINES ($)	0.0	0.0	50.00	100.00	100.00	250.00	250.00	250.00	250.00	250.00
HIRED LABOR CLEAR. ($)	0.0	0.0	0.0	0.0	0.0	130.00	225.00	350.00	350.00	350.00
HIRED LABOR PROD. ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MECH CLEARING@$375/HA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL EXPENDITURES ($)	0.0	0.0	50.00	230.00	230.00	380.00	475.00	740.00	740.00	740.00
TOTAL (MAN-DAYS)	79.	60.	105.	105.	125.	312.	421.	519.	623.	639.
ADD. CASH INCOME & EXP.										
CASH OUTLAY ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOAN-PROD. CREDIT ($)	350.00	150.00	150.00	150.00	150.00	0.0	0.0	0.0	0.0	0.0
LOAN REPAYMENT 10% ($)	-385.00	-165.00	-165.00	-165.00	-165.00	0.0	0.0	0.0	0.0	0.0
INTER. CREDIT 20% ($)	0.0	0.0	144.52	-55.48	-55.48	-55.48	-55.48	-55.48	-55.48	0.0
PURCHASE CATTLE ($)	-300.00	0.0	-200.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FARM FAMILY NET REV. ($)	-284.80	-9.68	208.39	887.46	1655.46	4999.49	6606.09	8042.69	8277.47	10693.06
FARM RET.-LABOR/MGMT ($)	-402.80	-99.68	50.39	729.46	1467.46	4661.49	6200.09	7614.69	7692.47	10085.06

```
MIKE MPS.OBJECTIVE IS VALUEADD

NAME          W/OROAD
ROWS
 L  FARMLAND
 L  FFLABOR = 6000
 L  UNLABOR
 L  ANIPOWER = 3500
 E  ANIBALNC
 E  RAGRISUB
 E  RCORN
 E  RPOTATO
 E  RRICE
 E  RSOYBEAN
 E  RWHEAT
 N  YIELD
 N  VALUEADD
COLUMNS
    AGRISUB   FARMLAND      1.00000   FFLABOR      910.00000
    AGRISUB   ANIPOWER    108.00000   RAGRISUB    3000.00000
    AGRISUB   YIELD      3000.00000
    CORN      FARMLAND      1.00000   FFLABOR      128.80000
    CORN      ANIPOWER     96.00000   RCORN       2500.00000
    CORN      YIELD      2500.00000
    POTATO    FARMLAND      1.00000   FFLABOR      270.00000
    POTATO    ANIPOWER     40.00000   RPOTATO     2000.00000
    POTATO    YIELD      2000.00000
    RICE      FARMLAND      1.00000   FFLABOR      257.00000
    RICE      ANIPOWER     96.00000   RRICE       1200.00000
    RICE      YIELD      1260.00000   VALUEADD  -     .87000
    SOYBEANS  FARMLAND      1.00000   FFLABOR      250.00000
    SOYBEANS  ANIPOWER     80.00000   RSOYBEAN    1150.00000
    SOYBEANS  YIELD      1150.00000
    WHEAT     FARMLAND      1.00000   FFLABOR      128.00000
    WHEAT     ANIPOWER    120.00000   RWHEAT      1100.00000
    WHEAT     YIELD      1100.00000
    HLABOR    FFLABOR  -    1.00000   UNLABOR        1.00000
    HLABOR    VALUEADD -     .15000
    TRANSAN   FFLABOR     26.00000   ANIPOWER      26.00000
    TRANSAN   ANIBALNC -  26.00000
    MKTVEG    ANIBALNC    26.00000   RAGRISUB  -  150.00000
    MKTVEG    VALUEADD    32.30000
    MKTCORN   ANIBALNC    26.00000   RCORN     -  150.00000
    MKTCORN   VALUEADD    21.40000
    MKTPOT    ANIBALNC    26.00000   RPOTATO   -  150.00000
    MKTPOT    VALUEADD    32.30000
    MKTRICE   ANIBALNC    26.00000   RRICE     -  150.00000
    MKTRICE   VALUEADD    32.30000
    MKTBEAN   ANIBALNC    26.00000   RSOYBEAN  -  150.00000
    MKTBEAN   VALUEADD    27.00000
    MKTWHEAT  ANIBALNC    26.00000   RWHEAT    -  150.00000
    MKTWHEAT  VALUEADD    15.00000
RHS
    RESOURCE  FARMLAND    33.00000   FFLABOR     6000.00000
    RESOURCE  UNLABOR    130.00000   ANIPOWER    3500.00000
    RESOURCE  RAGRISUB   568.00000   RCORN        637.00000
```

```
MIKE MPS.OBJECTIVE IS VALUEADD

PRIMAL        OBJ = VALUEADD     RHS = RESOURCE

TIME =     0.08  MINS.        PRICING     7
 SCALE =     .

   ITER   NUMBER  VECTOR  VECTOR  REDUCED      SUM
  NUMBER  INFEAS   OUT     IN     COST      INFEAS
M    1       3      9     17    1.00000-    .57513
     2              7     15    1.00000-    .32033
     3              6     14    1.00000-    .13100
     4              8     16    1.00000-    .
 FEASIBLE SOLUTION

PRIMAL        OBJ = VALUEADD     RHS = RESOURCE

TIME =     0.08  MINS.        PRICING     7
 SCALE =     .
 SCALE RESET TO    1.00000-

   ITER   NUMBER  VECTOR  VECTOR  REDUCED   FUNCTION
  NUMBER . NONOPT   OUT     IN     COST      VALUE
M    5       6      5     22    1.00000-    .62712-
M    6       1      2     21    1.00000-   2517.54
M    7       6      4     24     .35315-   3741.92
M    8       1     22      2    3.51549-   3764.72
 OPTIMAL SOLUTION
```

MIKE MPS,OBJECTIVE IS VALUEADD PAGE 9 - 74/123

	AGRISUB	CORN	POTATO	RICE	SOYBEANS	WHEAT	HLABOR	TRANSAN	1....
FARMLAND	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	.	.	FARMLA
FFLABOR	910.00000	128.8000	270.00000	257.00000	250.00000	128.00000	1.00000-	26.00000	FFLABO
UNLABOR	.	.	.	.	.	.	1.00000	.	UNLABO
ANIPOWER	108.00000	96.0000	40.00000	96.00000	80.00000	120.00000	.	26.00000	ANIPOW
ANIBALNC	.	.	.	.	.	.	.	26.00000-	ANIBAL
RAGRISUB	3000.0000	.	.	.	.	.	.	.	RAGRIS
RCORN	.	2500.0000	.	.	.	.	.	.	RCORN
RPOTATO	.	.	2000.0000	.	.	.	.	.	RPOTAT
RRICE	.	.	.	1200.0000	.	.	.	.	RRICE
RSOYBEAN	.	.	.	.	1150.0000	.	.	.	RSOYBE
RWHEAT	.	.	.	.	.	1100.0000	.	.	RW T
YIELD	3000.0000	2500.0000	2000.0000	1200.0000	1150.0000	1100.0000	.	.	YIL
VALUEADD	.	.	.	.87000-	.	.	.15000-	.	VALUEA

MIKE MPS,OBJECTIVE IS VALUEADD PAGE 10 - 74/123

	MKTVEG	MKTCORN	MKTPOT	MKTRICE	MKTBEAN	MKTWHEAT	RESOURCE	2..
FARMLAND	.	.	.	.	.	.	33.00000	FARMLAND
FFLABOR	.	.	.	.	.	.	6000.0000	FFLABOR
UNLABOR	.	.	.	.	.	.	130.00000	UNLABOR
ANIPOWER	.	.	.	.	.	.	3500.0000	ANIPOWER
ANIBALNC	26.00000	26.00000	26.00000	26.00000	26.00000	26.00000	.	ANIBALNC
RAGRISUB	150.00000-	.	.	.	.	.	568.00000	RAGRISUB
RCORN	.	150.00000-	.	.	.	.	637.00000	RCORN
RPOTATO	.	.	150.00000-	.	.	.	262.00000	RPOTATO
RRICE	.	.	.	150.00000-	.	.	865.00000	RRICE
RSOYBEAN	.	.	.	.	150.00000-	.	.	RSOYBEAN
RWHEAT	.	.	.	.	.	150.00000-	.	RWHEAT
VALUEADD	32.30000	21.40000	32.30000	32.30000	27.00000	15.00000	.	VALUEADD

MIKE MPS,OBJECTIVE IS VALUEADD

SECTION 1 - ROWS

NUMBER	...ROW..	AT	...ACTIVITY ..	SLACK ACTIVITY	..LOWER LIMIT.	..UPPER LIMIT.	.DUAL ACTIVITY
1	FARMLAND	BS	10.03903	22.96097	NONE	33.00000	.
2	FFLABOR	BS	5817.29153	182.70847	NONE	6000.00000	.
3	UNLABOR	BS	.	130.00000	NONE	130.00000	.
4	ANTPOWER	UL	3500.00000	.	NONE	3500.00000	1.11379-
5	ANTBALNC	EQ	.	.	.	.	1.11379-
6	RAGRISUB	EQ	568.00000	.	568.00000	568.00000	.04010
7	RCORN	EQ	637.00000	.	637.00000	637.00000	.04277
8	RPOTATO	EQ	262.00000	.	262.00000	262.00000	.02228
9	RRICE	EQ	865.00000	.	865.00000	865.00000	.08983
10	RSOYBEAN	BS	.	.	.	.	.
11	RWHEAT	BS	.	.	.	.	.
12	YIELD	BS	19818.12690	19818.12690-	NONE	NONE	.
13	VALUEADD	BS	3764.71887	3764.71887-	NONE	NONE	1.00000

```
MIKE MPS,OBJECTIVE IS VALUEADD

NAME          WITHROAD
ROWS
 L  FARMLAND
 L  CLAND
 L  FFLABOR
 L  UNLABOR
 E  TRLABBAL
 L  TRLABOR
 L  ANIPOWER
 E  ANIBALNC
 E  RAGRISUB
 E  RCORN
 E  RPOTATO
 E  RRICE
 E  RSOYBEAN
 E  RWHEAT
 N  INSECT
 N  TRNSPORT
 L  CREDIT
 N  YIELD
 N  VALUEADD
COLUMNS
    AGRISUB   FARMLAND      1.00000   FFLABOR      910.00000
    AGRISUB   ANIPOWER    108.00000   RAGRISUB    3600.00000
    AGRISUB   INSECT        1.15000   CREDIT         8.85000
    AGRISUB   YIELD      3600.00000   VALUEADD  -   10.00000
    CORN      FARMLAND      1.00000   FFLABOR      258.00000
    CORN      ANIPOWER     96.00000   RCORN       2500.00000
    CORN      TRNSPORT     54.00000   YIELD       2500.00000
    POTATO    FARMLAND      1.00000   FFLABOR      270.00000
    POTATO    ANIPOWER     40.00000   RPOTATO     2200.00000
    POTATO    INSECT        1.15000   CREDIT         8.85000
    POTATO    YIELD      2200.00000   VALUEADD  -   10.00000
    RICE      FARMLAND      1.00000   FFLABOR      258.00000
    RICE      ANIPOWER     96.00000   RRICE       1600.00000
    RICE      INSECT        1.14000   TRNSPORT     133.00000
    RICE      CREDIT         .87000   YIELD       1600.00000
    RICE      VALUEADD  -   2.01000
    SOYBEAN   FARMLAND      1.00000   FFLABOR      250.00000
    SOYBEAN   ANIPOWER     80.00000   RSOYBEAN    1150.00000
    SOYBEAN   YIELD      1150.00000
    TSOYBEAN  FARMLAND      1.00000   FFLABOR      250.00000
    TSOYBEAN  TRLABBAL      4.00000   RSOYBEAN    1400.00000
    TSOYBEAN  INSECT        1.14000   TRNSPORT     186.00000
    TSOYBEAN  CREDIT         .87000   YIELD       1400.00000
    TSOYBEAN  VALUEADD  -   2.01000
    WHEAT     FARMLAND      1.00000   FFLABOR      128.00000
    WHEAT     ANIPOWER    120.00000   RWHEAT      1100.00000
    WHEAT     YIELD      1100.00000
    TWHEAT    FARMLAND      1.00000   FFLABOR      128.00000
    TWHEAT    TRLABBAL     16.00000   RWHEAT      1100.00000
    TWHEAT    TRNSPORT    158.00000   YIELD       1100.00000
    LIVESTK   CLAND         1.00000   FFLABOR       36.50000
    LIVESTK   RCORN     -  600.00000   INSECT         1.82000
```

```
MIKE MPS,OBJECTIVE IS VALUEADD

    LIVESTK   TRNSPORT     13.30000   CREDIT         1.50000
    LIVESTK   YIELD       100.00000   VALUEADD      52.68000
    HLABOR    FFLABOR  -    1.00000   UNLABOR        1.00000
    HLABOR    VALUEADD -     .15000
    TRACSERV  TRLABBAL -    1.00000   TRLABOR        1.00000
    TRACSERV  VALUEADD -    5.50000
    TRKVEG    RAGRISUB - 5000.00000   VALUEADD    1000.00000
    TRKCORN   RCORN    - 5000.00000   VALUEADD     660.00000
    TRKPOT    RPOTATO  - 5000.00000   VALUEADD    1000.00000
    TRKRICE   RRICE    - 5000.00000   VALUEADD    1000.00000
    TRKBEAN   RSOYBEAN - 5000.00000   VALUEADD     833.00000
    TRKWHEAT  RWHEAT   - 5000.00000   VALUEADD     463.00000
    TRANSAN   FFLABOR      26.00000   ANIPOWER      26.00000
    TRANSAN   ANIBALNC -   26.00000
    MKTVEG    ANIBALNC     26.00000   RAGRISUB  -  150.00000
    MKTVEG    VALUEADD     32.30000
    MKTCORN   ANIBALNC     26.00000   RCORN     -  150.00000
    MKTCORN   VALUEADD     21.40000
    MKTPOTAT  ANIBALNC     26.00000   RPOTATO   -  150.00000
    MKTPOTAT  VALUEADD     32.30000
    MKTRICE   ANIBALNC     26.00000   RRICE     -  150.00000
    MKTRICE   VALUEADD     32.30000
RHS
    RESOURCE  FARMLAND     33.00000   CLAND         10.00000
    RESOURCE  FFLABOR    4365.00000   UNLABOR     3555.00000
    RESOURCE  TRLABOR      84.00000   ANIPOWER    2920.00000
    RESOURCE  RAGRISUB    568.00000   RCORN        637.00000
    RESOURCE  RPOTATO     865.00000   RRICE        262.00000
    RESOURCE  CREDIT      250.00000
ENDATA
```

	AGRISUB	CORN	POTATO	RICE	SOYBEAN	TSOYBEAN	WHEAT	TWHEAT	1.1....1
FARMLAND	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	FARMLAND
FFLABOR	910.00000	258.00000	270.00000	258.00000	250.00000	250.00000	128.00000	128.00000	FFLABOR
TRLABBAL	.	.	.	.	.	4.00000	.	16.00000	TRLABBAL
ANIPOWER	108.00000	96.00000	40.00000	96.00000	80.00000	.	120.00000	.	ANIPOWER
RAGRISUB	3600.0000	.	.	.	.	.	.	.	RAGRISUB
RCORN	.	2500.0000	.	.	.	.	.	.	RCORN
RPOTATO	.	.	2200.0000	.	.	.	.	.	RPOTATO
RRICE	.	.	.	1600.0000	.	.	.	.	RRICE
RSOYBEAN	.	.	.	.	1150.0000	1400.0000	.	.	RSOYBEAN
RWHEAT	.	.	.	.	.	.	1100.0000	1100.0000	RWHEAT
INSECT	1.15000	.	1.15000	1.14000	.	1.14000	.	.	INSECT
TRNSPORT	.	54.00000	.	133.00000	.	186.00000	.	158.00000	TRNSPORT
CREDIT	8.85000	.	8.85000	.87000	.	.87000	.	.	CREDIT
YIELD	3600.0000	2500.0000	2200.0000	1600.0000	1150.0000	1400.0000	1100.0000	1100.0000	YIELD
VALUEADD	10.00000-	.	10.00000-	2.01000-	.	2.01000-	.	.	VALUEADD

	LIVESTK	HLABOR	TRACSERV	TRKVEG	TRKCORN	TRKPOT	TRKRICE	TRKBEAN	2.2....
CLAND	1.00000	.	.	.	.	.	.	.	CLAND
FFLABOR	36.50000	1.00000-	.	.	.	.	.	.	FFLABOR
UNLABOR	.	1.00000	.	.	.	.	.	.	UNLABOR
TRLABBAL	.	.	1.00000-	.	.	.	.	.	TRLABBA
TRLABOR	.	.	1.00000	.	.	.	.	.	TRLABOR
RAGRISUB	.	.	.	5000.0000-	.	.	.	.	RAGRISU
RCORN	600.00000-	.	.	.	5000.0000-	.	.	.	RCORN
RPOTATO	.	.	.	.	.	5000.0000-	.	.	RPOTATO
RRICE	.	.	.	.	.	.	5000.0000-	.	RRICE
RSOYBEAN	.	.	.	.	.	.	.	5000.0000-	RSOYBEA
INSECT	1.62000	.	.	.	.	.	.	.	INSECT
TRNSPORT	13.30000	.	.	.	.	.	.	.	TRNSPOR
CREDIT	1.50000	.	.	.	.	.	.	.	CREDIT
YIELD	100.00000	.	.	.	.	.	.	.	YIELD
VALUEADD	52.68000	.15000-	5.50000-	1000.0000	660.00000	1000.0000	1000.0000	833.00000	VALUEAD

	TRKWHEAT	TRANSAN	MKTVEG	MKTCORN	MKTPOTAT	MKTRICE	RESOURCE		3.3.....1
FARMLAND	.	.	.	.	.	.	33.00000	FARMLAND	
CLAND	.	.	.	.	.	.	10.00000	CLAND	
FFLABOR	.	26.00000	.	.	.	.	4365.0000	FFLABOR	
UNLABOR	.	.	.	.	.	.	3555.0000	UNLABOR	
TRLABOR	.	.	.	.	.	.	84.00000	TRLABOR	
ANIPOWER	.	26.00000	.	.	.	.	2920.0000	ANIPOWER	
ANIBALNC	.	26.00000-	26.00000	26.00000	26.00000	26.00000	.	ANIBALNC	
RAGRISUB	.	.	150.00000-	.	.	.	568.00000	RAGRISUB	
RCORN	.	.	.	150.00000-	.	.	637.00000	RCORN	
RPOTATO	.	.	.	.	150.00000-	.	865.00000	RPOTATO	
RRICE	.	.	.	.	.	150.00000-	262.00000	RRICE	
RWHEAT	5000.0000-	.	.	.	.	.	.	RWHEAT	
CREDIT	.	.	.	.	.	.	250.00000	CREDIT	
VALUEADD	463.00000	.	32.30000	21.40000	32.30000	32.30000	.	VALUEADD	

UNCLASSIFIED

ANNEX IV-A Page 2 of 3
Exhibit 15 Pag.2 of 4

```
                MIKE MPS,OBJECTIVE IS VALUEADD

PRIMAL        OBJ = VALUEADD    RHS = RESOURCE

TIME =     0.09  MINS.        PRICING     7
 SCALE =     .

   ITER    NUMBER   VECTOR   VECTOR   REDUCED      SUM
  NUMBER   INFEAS    OUT      IN       COST      INFEAS
M     1       3      11       22     .44000-     .29340
      2             10       21     .50000-     .16600
      3              9       20     .72000-     .05240
      4             12       23     .32000-     .
 FEASIBLE SOLUTION

PRIMAL        OBJ = VALUEADD    RHS = RESOURCE

TIME =     0.10  MINS.        PRICING     7
 SCALE =     .
 SCALE RESET TO    1.00000-

   ITER    NUMBER   VECTOR   VECTOR   REDUCED    FUNCTION
  NUMBER   NUNOPT    OUT      IN       COST       VALUE
M     5      11       3       33     .97727-    6376.12
      6             13       35     .83300-    6376.12
      7             14       36     .46300-    6376.12
M     8       2     17       29     .00144-    11377.2
      9              8       40     .00230-    11377.2
M    10      10      4       32     .58260-    11476.9
 OPTIMAL SOLUTION
```

MIKE MPS,OBJECTIVE IS VALUEADD

SECTION 1 - ROWS

NUMBER	...ROW..	AT	...ACTIVITY...	SLACK ACTIVITY	..LOWER LIMIT.	..UPPER LIMIT.	.DUAL ACTIVITY
1	FARMLAND	BS	26.99[illegible]	4.00685	NONE	33.00000	.
2	CLAND	BS	.	10.00000	NONE	10.00000	.
3	FFLABOR	UL	4365.000[illegible]	.	NONE	4365.00000	1.27907-
4	UNLABOR	UL	3555.00000	.	NONE	3555.00000	1.12907-
5	TKLABBAL	BS	.	.	.	.	.
6	TKLABOR	BS	.	84.00000	NONE	84.00000	.
7	ANIPOWER	BS	1213.05171	1706.94829	NONE	2920.00000	.
8	ANIBALNC	EQ	.	.	.	.	.08846-
9	KAGRISUB	EQ	568.00000	.	568.00000	568.00000	.34961
10	KCORN	EQ	637.00000	.	637.00000	637.00000	.13200
11	KPOTATO	EQ	865.00000	.	865.00000	865.00000	.20000
12	KRICE	EQ	262.00000	.	262.00000	262.00000	.21271
13	KSOYBEAN	EQ	.	.	.	.	.16660
14	KWHEAT	EQ	.	.	.	.	.09260
15	INSECT	BS	32.65404	32.65404-	NONE	NONE	.
16	TRANSPORT	BS	54.01181	54.01181-	NONE	NONE	.
17	CREDIT	UL	250.00000	.	NONE	250.00000	9.56510-
18	YIELD	BS	64086.63838	64086.63838-	NONE	NONE	.
19	VALUEADD	BS	11476.86519	11476.86519-	NONE	NONE	1.00000

MIKE MPS,OBJECTIVE IS VALUEADD

SECTION 2 - COLUMNS

NUMBER	.COLUMN.	AT	...ACTIVITY...	..INPUT COST..	..LOWER LIMIT.	..UPPER LIMIT.	.REDUCED COST.
20	AGRISUB	BS	.15778	10.00000-	.	NONE	.
21	CORN	BS	.59691	.	.	NONE	.
22	POTATO	BS	28.07471	10.00000-	.	NONE	.
23	RICE	BS	.16375	2.01000-	.	NONE	.
29	HLABOR	BS	3555.00000	.15000-	.	NONE	.
32	TRKCORN	BS	.17105	660.00000	.	NONE	.
33	TRKPOT	BS	12.17987	1000.00000	.	NONE	.
35	TRKBEAN	BS	.	833.00000	.	NONE	.
36	TRKWHEAT	BS	.	463.00000	.	NONE	.
40	MKTPOTAT	BS	.	32.30000	.	NONE	.

BIBLIOGRAPHY

1. Gordon N. Keller and Percy Aitken. Socio-Cultural Factors in Colonization in Bolivia. An Integrated Model for New Lands Development. La Paz, Bolivia: Utah State Univ./USAID/RDD November 1973 (Mimeographed)

2. Wharton, Clifton R., Ed., Subsistence Agriculture and Economic Development. Chicago: Aldine Publishing Company

3. Nelson, Michael. The Development of Tropical Lands. Baltimore: The John Hopkins University Press. 1973.

4. Rural Work Committee. Agricultural Life in the Colonies: An Economic Study in 10 Colonies North of San Cruz, Bolivia Methodist Church in Bolivia.

5. Thomas C. Royden and E. Boyd Wennergren. The Impact of Access Roads on Spontaneous Colonization. /Utah State University /Utah:

6. Japan Emigration Service, Santa Cruz Branch. Conditions Within the Jurisdiction. 1974

7. Falcon, Walter P., Agricultural Employment in Less Developed Countries: General Situation, Research Approaches and Policy Palliatives. IBRD Economic Staff Working Paper No. 113. April 1971.

8. Bolivian-Utah State/USAID Study Team. Irrigation Analysis for Selecting Crops, Santa Cruz, Bolivia. Utah. July 1972

9. Univ. of Wisconsin, Land Economics, Volume L, No. 1, February 1974.

10. Boyd Wennergren, Allen Lebaron, Lee Bailey and Morris Whitaker. Irrigation and Non-Irrigation Alternatives for Reducing Sugar Cane Transportation Costs in Santa Cruz, Bolivia. Dept. of Economics, Utah State University

11. Gittinger, J. Price, Economic Analysis of Agricultural Projects. EDA, IBRD. The John Hopkins Univ. Press, Baltimore.

12. Institute of Nutrition of Central America and Panama (INCAP). Nutritional Evaluation of the Population of Central America and Panama 1965 - 1967. Dept. of Health, Education and Welfare Publication No. (HSM) 72-8120.

13. Wessel, Kelso L. The Profitiability of Small Farms in Bolivia. Cornell International Agric. Development Mimeograph 37. Cornell Univ. April 1972

14. International Bank for Reconstruction and Development. Second Atlantico Development Project, Colombia. Agriculture Projects Department. June 1972.

15. Seiler, John A. Systems Analysis in Organizational Behavior. Harvard University. Irwin-Dorsey Series in Behavioral Science. Richard D. Irwin, Inc. and the Dorsey Press, Illinois

16. Royden, Tom. "Preliminary Report on the Impact of Access Road on Spontaneous Colonization." USU Series 92/73, Utah State Univ. 1972

17. Stanton, Bernard F. Farm Budgeting for Project Analysis. Agricultural Projects Course, IBRD/EDI, 1973.

18. International Bank for Reconstruction & Development. Guidelines for Agricultural Project Analysis. Agricultural Projects Course, Economic Dev. Inst. 1973

19. Inter-American Development Bank Papers on Agricultural Development No. 7. Evaluation of Tropical Colonization Projects in Latin America. June 1970
Washington, D.C.

20. Farm Budgets, Settlement Projects, Sensitivity Analysis and Feeder Roads

21. Instituto Nacional de Colonizacion. Estudio Socio-Economico Areas de Colonizacion Espontaneo y Orientada.

22. Roberts, N. Keith, "Review -- Bolivian Colonization." Utah State University. May 1973.

23. Federacion Departamental de Empresarios Privados, Santa Curz, Bol. Estadisticas Economicas y Sociales del Departamento de Santa Cruz. 1973

24. Arturo Isreal, IBRD Methodology for Penetration & Feeder Roads. IBRD, Working Paper 70. 1970

The preceeding annex evaluates economic benefits accruing to the project based on a simulated farm model developed from estimated resource availabilities, yield data and prices which obtain in the project area. A companion analysis has also been done relying on observed farm income data as a surrogate estimate for benefits to be obtained in the project area with and without project inputs.

The basic source for this data is Grabers 1972 study of an extensive sample of settlers at ten locations in the Bolivian oriente.1/ The ten areas covered in that study represent colonies in various stages of development. The earliest and most advanced in terms of development were established in the mid 1950's and at the time of the study had been in existence for 15-18 years. The newest settlement area included in the study had been established only two to three years earlier. Colonies in various intermediate stages of development were also included which provides a basis for judgements as to how rapidly farm incomes increase in the settlement process.

Because of the different stages of development of each of the sub-areas of the project, the San Julian and Chane/Piray areas are analyzed separately. Initial bench mark data for farm income were established and assumptions about productivity increases inferred from Grabers study were applied in order to estimate the stream of net farm income accruing over a 20 year period. These income flows were checked against bench mark estimates based on the data taken from older and established settlement areas, and are believed to be reasonable projections of farm income, at constant prices, over the 20 hear period of analysis.

Further assumptions were made with respect to the rate of settler inflow with and without the project inputs. These are set forth explicitly in the sections below.

a. Chane/Piray Area

In the Chane/Piray area, where 6,000 farm units now exist, it is assumed that an additional 1,000 farm units will be established. As a result of the road improvement program and provision of other services as envisioned in the project, it is assumed that this increase

---

1/ Kenneth Graber, Agricultural Life in the Colonies op.cit.

will occur over 4 years. Without the project, it is assumed this increase would not be achieved until the 12th year. Those new farm units which ultimately will develop will presumably be similar in character to farms already established in the area in term of size, capital resources, crops produced and net income; and therefore, estimates of farm returns for existing farms are assumed applicable to those new farms which will be integrated with the area.

Graber's study of farm characteristics for 4 sub-areas of the Chane/Piray region developed estimates of net farm income which represent returns to farm labor and management inputs. A weighted average derived from a stratified sample of 125 campesino farmers in these four areas indicates an average return to family labor, hired labor and farm management (the human inputs of the farming operation) of $b 5,500 per farm unit. At the 12-1 exchange rate which prevailed during this period the dollar equivalent is calculated at $458 per farm. This estimate represents the net contribution per farm to the national economy for this period.

In order to estimate the current farm income equivalent it is necessary to adjust the above figures to reflect productivity increase which have occurred in the interim and to take account of the rapid increase in prices which in part reflect adjustments to the 66% devaluation of the peso in 1972, and in part which reflect increased world and domestic market trends .

Average wholesale prices for corn and rice in Bolivia as a whole (the two major commercial crops produced in Chane/Piray area) have increased by about three hundred percent since the 1972 period. Not all of this price increase will be reflected in an increase in farm income for at the same time farms costs, especially transport costs, have increased as truckers have increased their haulage rates to capture a share of those price increases which have accrued to farmers. In the past transportation costs in the Chane/Piray area have ranged from 20-30 percent of the farm commodity prices, and in the absence of any recent evidence on increased transportation costs it will be assumed that these ratios still hold.

In view of these increased prices and allowing for a modest increase due to greater productivity the assumption that net returns have increased by about 230 percent seems reasonable. Thus, average per farm income (as defined above) in the Chane/Piray area is currently estimated at $b 12,650 or in dollar equivalents at the 20=1 exchange

rate $632 per farm. This rather significant increase over the two year period is not at all inconsistent with the world-wide trend in which farm incomes in many countries -- both developed and less developed -- have jumped rapidly in response to inflated prices in world and domestic markets. Moreover, one would expect that where utilization of capital inputs such as fertilizers and other agrochemicals is low and thus represent a minimal share of farm production costs (as in the Chane/Piray area) product price increases will be to a large degree manifested in higher returns to farm labor and management. Thus the estimate of $632 seems to be a reasonable point of departure in estimating the project benefits in the Chane/Piray area.

In the absence of the project inputs in this area it is assumed that farm income would grow at a rate of 2% per year for a period of 10 years and thereafter stabilize at the level of the 10th year. Given the assumptions about increased settler in-migration set forth earlier the farm income stream over 20 year period is shown in Exhibit 1.

With the addition of the project inputs the increase in farm returns will be much more rapid. As indicated earlier, the inflow of the additional 1,000 farm families would be accomplished in four years rather than twelve. Likewise the average net income per farm would increase as lower costs of product marketing (transportation) were realized. It is realistic to assume that even in absence of productivity increases, net incomes for the Chane/Piray area would approach average incomes currently being realized in the Cuatro Ojitos settlement which is located on the all-weather road at the southern boundary of the Chane/Piray area. Data taken from Grabers study indicates average farm incomes in the Cuatro Ojitos area in 1972 were $b 12,625 per family--more than twice that computed for the 4 sub-areas in the Chane/Piray for that same year. This figure, adjusted to reflect current prices and exchange rates, indicates a current average income of about $1,450 for the Cuatro Ojitos area, and is a useful bench mark against which to compare returns. Because the Chane/Piray development area is located further from the market than is Cuatro Ojitos and is thus subject to higher transportation costs, this figure is somewhat above the average income which could be achieved for the Chane/Piray as a whole. With the effects of road construction being manifested in lower transportation costs in the third year and being fully realized during the fifth year it is assumed that, on the average, farm incomes will increase by 10 percent per year from the third to the fifth year as a direct result of reduced transportation costs.

Moreover further income increases would be achieved as the effects of the project investments in agricultural production services are felt. It is assumed that productivity increases for the first three years will remain at 2 percent as before. Afterward with the establishment of research and extension activities and the full operation of the agricultural service centers including the credit program it is assumed that a growth rate of 4 percent will be sustained for a period of ten years after which farm income will stabilize at the level of the 13th year. The estimated benefits accruing to the region under the assumption that project inputs are made is shown in Exhibit 2.

The difference in the net benefit streams with and without the project is set forth in Exhibit 3. The present value of the, benefits derived from the project inputs in the Chane/Piray area, discounted at 15% rate over 20 years is calculated at $15,192,000. Project investment costs allocatable to the Chane/Piray sub-area are estimated at $3,984,000. Assuming that these funds are disbursed in equal installments over the first four years of the project and thereafter annual project maintenance and program sustaining costs are $300,000 per year, the present value of the cost stream discounted at the same 15% rate is $3,864,000, giving a benefit cost ratio for project investment in the Chane/Piray of 3.9:1.

b. San Julian Area

Without the existance of a road the 200 or so families presently living in the San Julian area have little opportunity to participate in commercial markets of the Montero-Santa Cruz areas. Most of the San Julian's current production is utilized for home consumption or intra-regional trade. Only a small amount of corn is currently marketed outside the area. Because of low returns to farmers in the San Julian, and with only about 200 settlers presently located there, the area contributes very little to the value-added of the Bolivian economy. Completion of the German-GOB road from Puerto Banegas to San Julian about two years hence will improve marketing conditions for those settlers already in the San Julian area and provide a modest incentive for some increased settlment even in the absence of loan assistance for this project. A greater volume of agricultural commodities will move into the markets of Montero and Santa Cruz, and the area's net contribution to national productivity will no doubt increase.

Without the inputs proposed for financing by this project it is assumed that the migration into the San Julian area

will proceed at a rate of about 50 familes per year for the first three years, and then increase more rapidly over the next several years until a maximum of 1,000 settlers are absorbed in the area made accesible by completion of the German-GOB road.

As a result of general expansion and productivity increases (even without project inputs), farm incomes can be expected to grow from the present average of about $250 per farm unit at a rate of about 5 percent for the first five years, 3 percent for a second five years period and 2 percent thereafter up to the twentieth year. Additionally as a result of improved access with the completion of the German-GOB road it is assumed that quantum increases in the net farm income of 15% per year will occur in the 3rd, 4th, and 5th year By the tenth year average farm income will be slightly less than current income estimated for the Chane/Piray area(consistant with the comparable stages of development of the two areas). The estimated benefits flowing from the San Julian area in the absence of loan financed inputs are given in Exhibit 4.

With the addition of project inputs however, the rate of settlement will proceed much more rapidly. A diligent promotion effort by the INC, along with the incentives offered as a result of project inputs is expected to result in 4,000 settler in the area by the 4th year.

Additionally the project inputs are expected to result in 8 percent annual productivity increases over the first five years, 6 percent for the next ten years and 4 percent thereafter. Because of the relatively low level of current productivity, assumption of these higher rates of growth during the early years of the project seem justified. Completion of the German-GOB road as assumed before, is expected to result in 15% increases in income during the 3rd, 4th, and 5th year. The estimated flow of regional returns for the San Julian area, under the assumption given above are developed in Exhibit 5.

Exhibit 6 indicates the difference in the regional income flow with and without the project inputs and shows the present value discounted at a 15% rate of this net benefits stream equaling $9.9 million. Estimated project expenditures which are directly chargeable to the San Julian sub-area are estimated at $7.68 million. This figure does not include the estimated cost of land indicated in the Financial Table presented in I, A, 5. Discounting the cost out-flow in the same manner as was calculated for the Chane/Piray area and taking into consideration maintenance and continuing program expenses gives a cost benefit ratio of 1.5:1 for the investment in the San Julian area.

It will be noted that benefits calculated as above do not include the value added as a result of the development of farms in the commercial agriculture sector. Assuming an additional 30,000-40,000 hectares of productive land is developed by the large farm sector, with a value-added of approximately about $100 per hectare annually, would almost double the net benefit stream for the San Julian area.

Considering the project as a whole the present value of the benefit stream generated by project investment is calculated at $25.0 million. Discounted costs, excluding value of land and cost of the land resource study which are not chargeable against project benefits, are $10.4 million which give a benefit cost ratio of 2.4:1 for the project as a whole.

Estimated Returns From Agricultural Production Without Project Inputs
Chane/Piray Area

Year	Number of New Migrants	Total No Farming Units	Average Income Per Farm $	Total Income For Region $ 1000
0	-	6,000	632	3,792
1	80	6,080	645	3,916
2	80	6,160	657	4,047
3	80	6,240	671	4,187
4	80	6,320	684	4,323
5	80	6,400	697	4,461
6	80	6,480	712	4,614
7	80	6,560	726	4,762
8	80	6,640	740	4,914
9	80	6,720	755	5,074
10	80	6,800	770	5,236
11	100	6,900	770	5,313
12	100	7,000	770	5,390
13	0	7,000	770	5,390
14	0	7,000	770	5,390
15	0	7,000	770	5,390
16	0	7,000	770	5,390
17	0	7,000	770	5,390
18	0	7,000	770	5,390
19	0	7,000	770	5,390
[illegible]	0	7,000	770	5,390

Estimated Returns From Agricultural Production With Project Inputs
Chane/Piray Area

Year	Number of New Migrants	Total No.Farming Units	Average Income Per Farm $	Total Income For Region $ 100
0		6,000	632	3,792
1	250	6,250	645	4,031
2	250	6,500	722	4,693
3	250	6,750	809	5,461
4	250	7,000	922	6,454
5	0	7,000	1,051	7,357
6	0	7,000	1,093	7,651
7	0	7,000	1,133	7,952
8	0	7,000	1,182	8,274
9	0	7,000	1,229	8,946
10	0	7,000	1,278	9,303
11	0	7,000	1,329	9,674
12	0	7,000	1,382	10,066
13	0	7,000	1,438	10,066
14	0	7,000	1,438	10,066
15	0	7,000	1,438	10,066
16	0	7,000	1,438	10,066
17	0	7,000	1,438	10,066
18	0	7,000	1,438	10,066
19	0	7,000	1,438	10,066
20	0	7,000	1,438	10,066

Estimated Benefits Attributable to Project Execution Chane/Piray Area

Year	Net Regional Returns With Project Inputs	Net Regional Returns Without Project Inputs	Returns Attributable To Project Execution	Discounted Present Value of Returns Attributable to Project*
0	3,792	3,792	0	
1	4,031	3,916	115	100
2	4,693	4,047	646	488
3	5,461	4,187	1,274	838
4	6,454	4,323	2,131	1,218
5	7,357	4,461	2,896	1,439
6	7,651	4,614	3,037	1,312
7	7,952	4,762	3,190	1,199
8	8,274	4,914	3,360	1,098
9	8,603	5,074	3,529	1,003
10	8,946	5,236	3,710	917
11	9,303	5,313	3,990	857
12	9,674	5,390	4,284	801
13	10,066	5,390	4,676	760
14	10,066	5,390	4,676	661
15	10,066	5,390	4,676	574
16	10,066	5,390	4,676	500
17	10,066	5,390	4,676	434
18	10,066	5,390	4,676	378
19	10,066	5,390	4,676	329
20	10,066	5,390	4,676	286
			Total	15,192

* 15% discount rate

Estimated Returns from Agricultural Production Without Project Inputs
San Julian Area

Year	Number of New Migrants	Total No Farming Units	Average Income Per Farm $	Total Income For Region $ 1000
0		200	250	50
1	50	250	262	66
2	50	300	276	83
3	50	350	331	116
4	100	450	397	179
5	100	550	476	273
6	100	650	490	319
7	100	750	505	379
8	100	850	520	442
9	100	950	535	509
10	50	1,000	551	551
11	0	1,000	563	563
12	0	1,000	573	573
13	0	1,000	585	585
14	0	1,000	576	576
15	0	1,000	609	609
16	0	1,000	621	621
17	0	1,000	634	634
18	0	1,000	646	646
19	0	1,000	659	659
20	0	1,000	672	672

Estimated Returns from Agricultural Production With Project Inputs
San Julian Area

Year	Number of New Migrants	Total No Farming Units	Average Income Per Farm $	Total Income For Region $ 1000
0		200	250	50
1	300	500	270	135
2	600	1,100	291	320
3	1,100	2,200	359	789
4	1,800	4,000	441	1,764
5	0	4,000	542	2,168
6	0	4,000	575	2,300
7	0	4,000	609	2,436
8	0	4,000	646	2,548
9	0	4,000	684	2,763
10	0	4,000	725	2,900
11	0	4,000	768	3,072
12	0	4,000	817	3,268
13	0	4,000	863	3,462
14	0	4,000	915	3,660
15	0	4,000	970	3,880
16	0	4,000	1,009	4,036
17	0	4,000	1,049	4,196
18	0	4,000	1,091	4,364
19	0	4,000	1,135	4,540
20	0	4,000	1,181	4,724

Net Benefits Attributable to Project Execution - San Julian Area
(all figures in $ 000)

Year	Net Regional Returns With Project Inputs	Net Regional Returns Without Project Inputs	Returns Attributable To Project Execution	Discounted Present Value of Returns Attributable to Project*
0	50	50	0	-
1	135	66	69	60
2	320	83	237	179
3	789	116	673	443
4	1,764	179	1,585	906
5	2,168	273	1,895	942
6	2,300	319	1,981	856
7	2,436	379	2,057	773
8	2,548	442	2,142	700
9	2,763	509	2,227	633
10	2,900	551	2,349	581
11	3,072	563	2,509	539
12	3,268	573	2,695	504
13	3,462	585	2,867	466
14	3,660	576	3,084	436
15	3,880	609	3,271	402
16	4,036	621	3,415	365
17	4,196	634	3,562	331
18	4,364	646	3,718	300
19	4,540	659	3,881	273
20	4,724	672	4,052	248
			Total	9,937

* 15% discount rate.

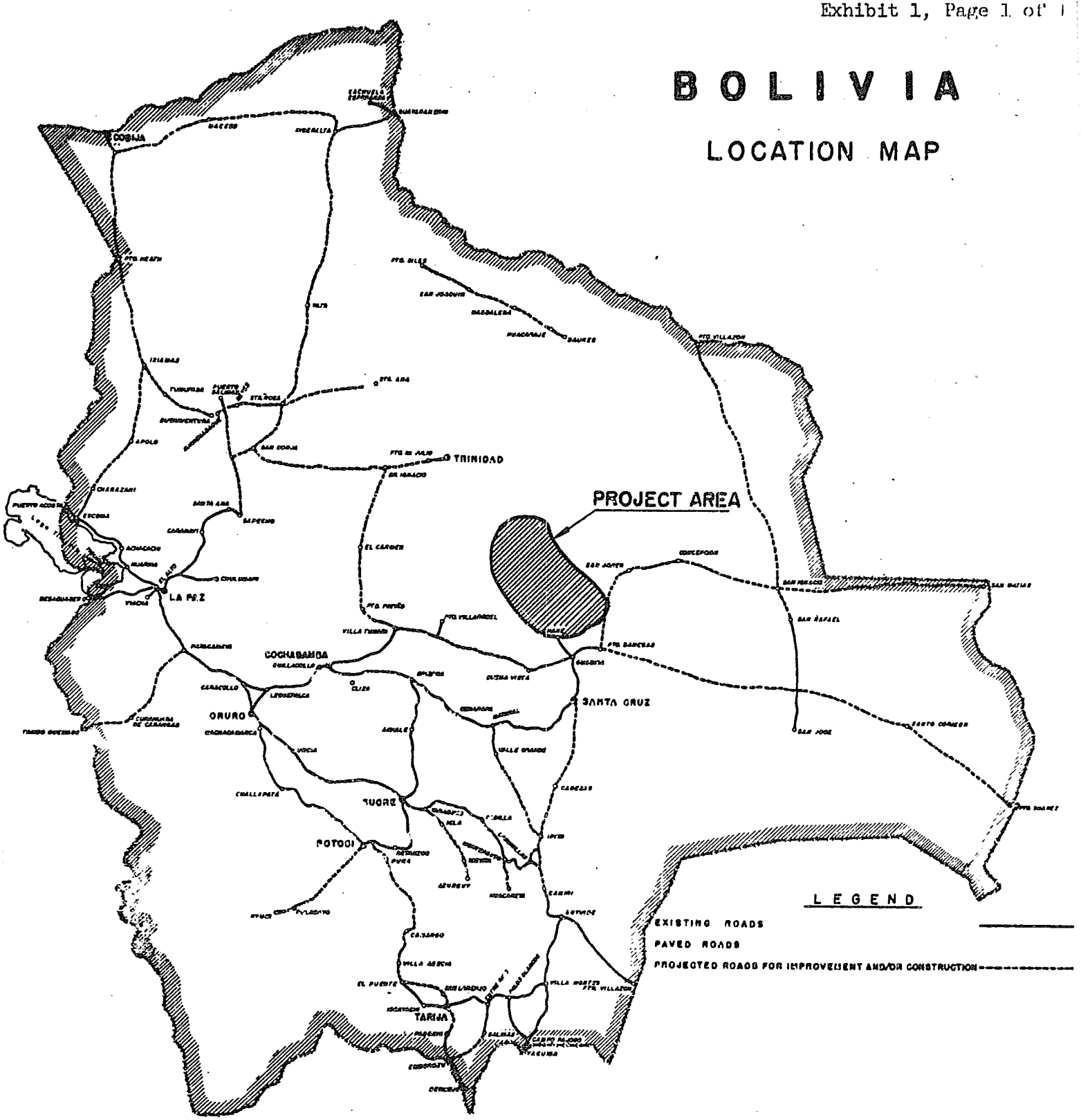
DETAILED FINANCIAL PLAN AND COST ESTIMATE
(US$ 000)

	AID Loan For.Exch.	AID Loan Local Curr.	AID Loan Total	AID Grant	GOB Local Curr.	Comm.Contr. Local Curr.	Other Donors Local Curr.	Total Project
1) Roads								
a. Penetration Roads	2,809	3,923	6,732		174	150		7,056
b. Access trails	1,106	-	1,106		468			1,574
Sub-Total	3,915	3,923	7,838	-	642	150	-	8,630
2) Productive Services								
Agricultural Service Centers								
a. Buildings & Equipment	143	347	490		54			544
b. Research & Extension					200			200
c. Training					100			100
d. Credit		500	500		180			680
Sub-Total	143	847	990	-	534	-	-	1,524
3) Social Services								
a. Potable Water								
Equip. & Supplies	277		277					277
Drilling & Maint.					48			48
b. Sanitary Posts								
Bldgs. & Equip.	12	13	25					25
Operating Expenses					70		100	170
c. Orientation								
Equip. & Vehicles	25		25					25
Administration					25		100	125
Sub-Total	314	13	327	-	143	-	200	670

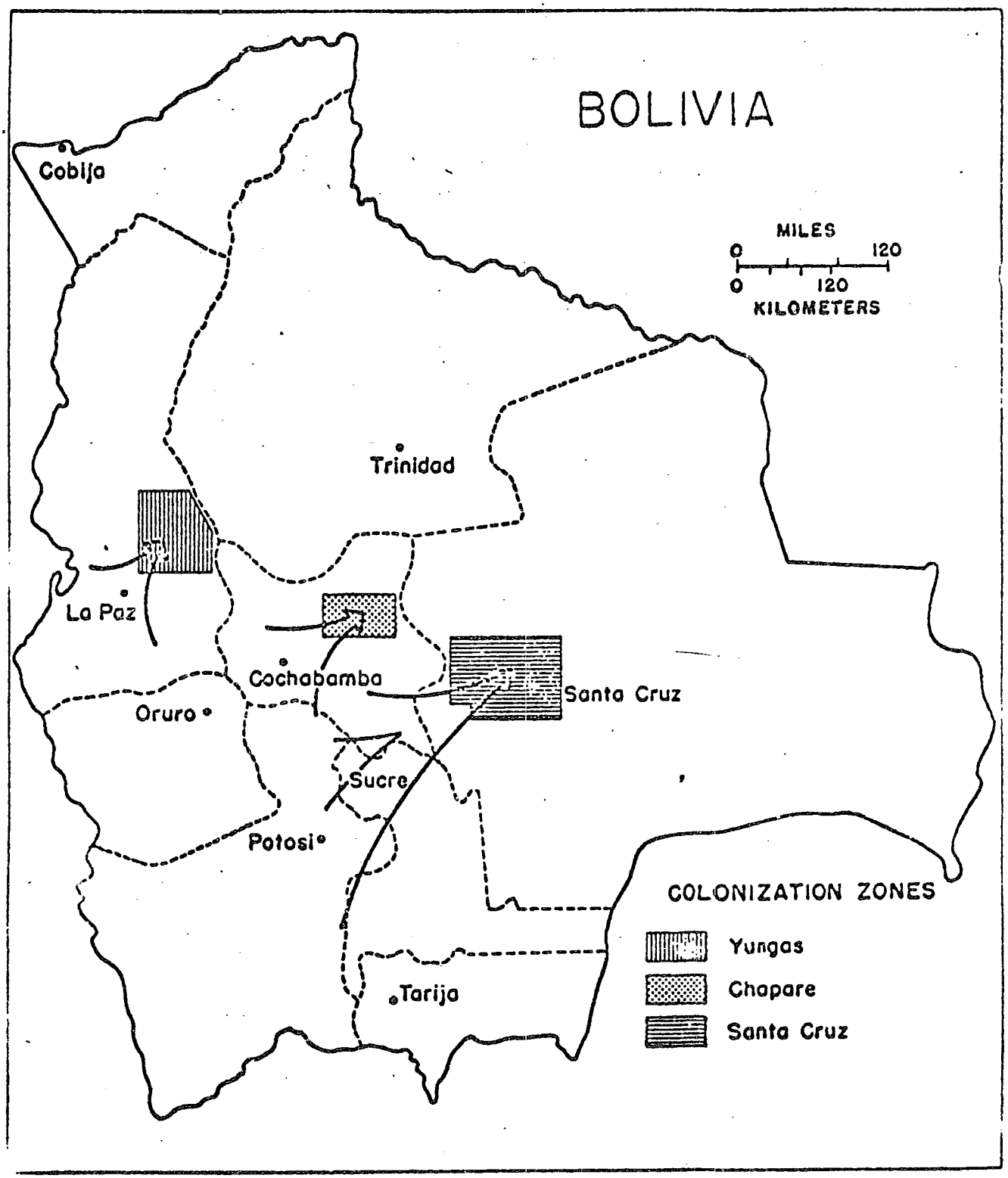
	AID Loan For.Exch.	AID Loan Local Curr.	AID Loan Total	AID Grant	GOB Local Curr.	Comm.Contr. Local Curr.	Other Donors Local Curr.	Total Project
4) Project Administration								
a. Admin. Support								
Equip. & Vehicles	40		40					40
Administration					520			520
b. Technical Assistance								
Loan Funded	150		150					150
Grant Funded				175				175
c. Titling Admin.					105			105
Sub-Total	190	-	190	175	625	-	-	990
5) Project Location								
a. Land					3,000			3,000
b. Land Res. Study								
Equip. & Materials	178		178					178
Operations	72		72		160			232
Sub-Total	250	-	250	-	3,160	-	-	3,410
Total	4,812	4,783	9,595	175	5,104	150	200	15,224
Percentage			63.0%	1.2%	33.5%	1.0%	1.3%	100%

BOLIVIA

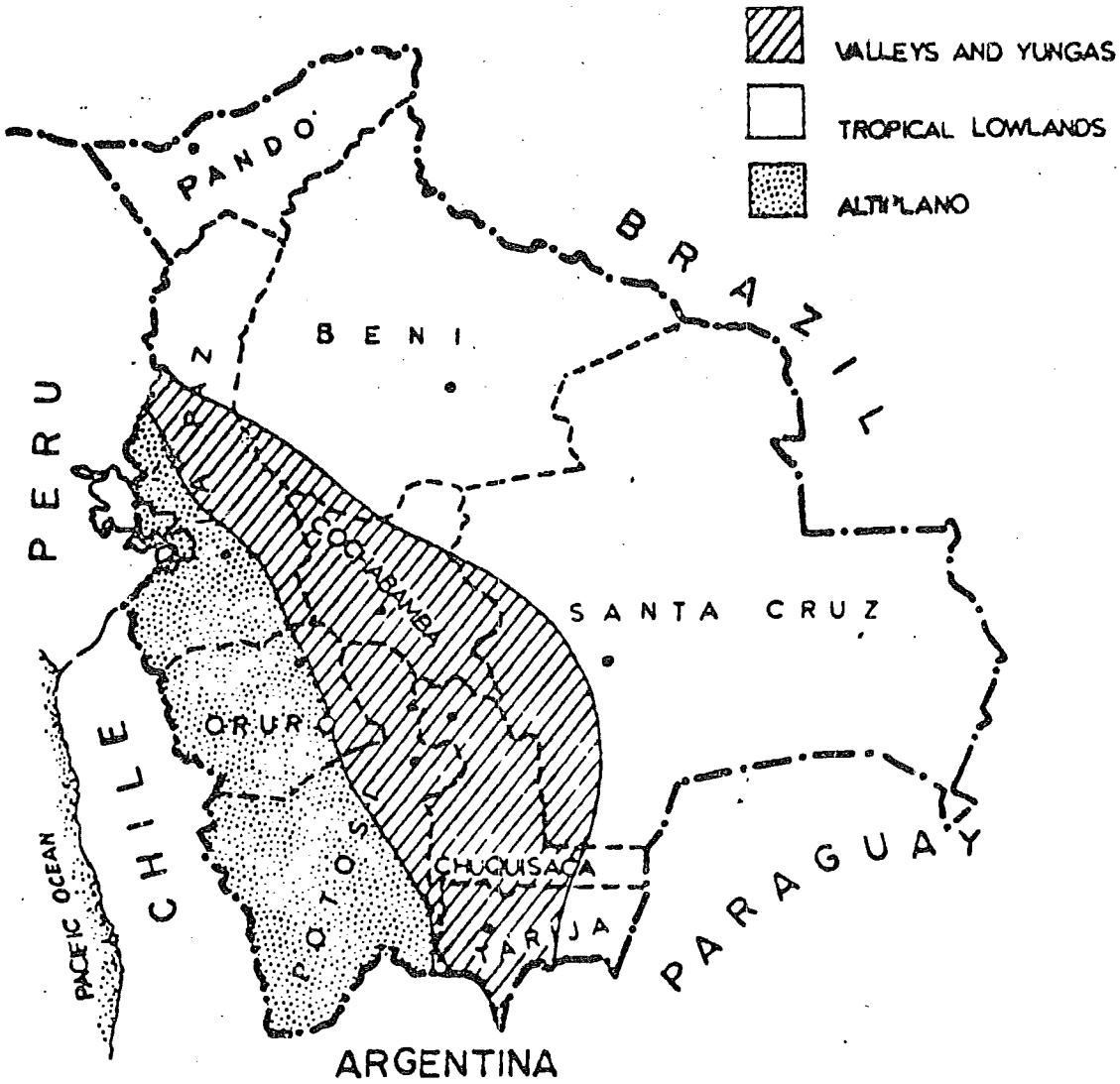
LOCATION MAP

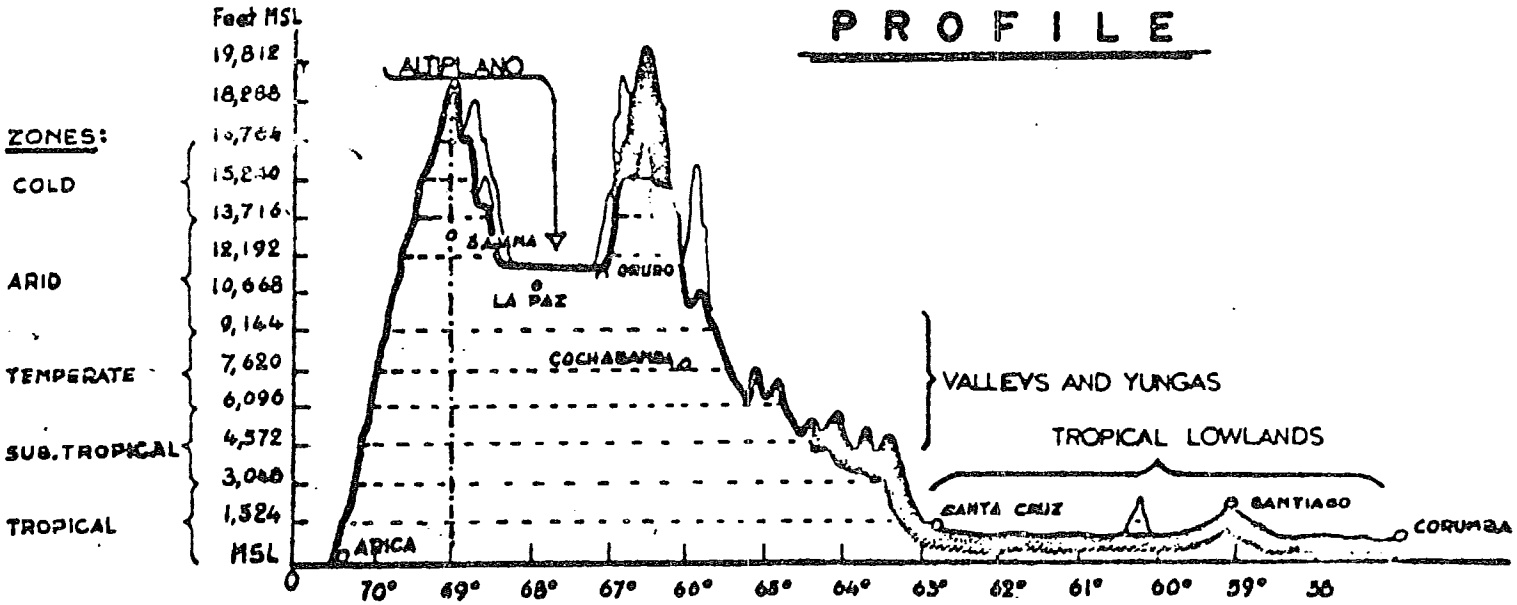


Internal migration patterns during recent decades, Bolivia, 1966



BOLIVIA


VALLEYS AND YUNGAS
TROPICAL LOWLANDS
ALTIPLANO
PANDO
BENI
BRAZIL
PERU
LA PAZ
COCHABAMBA
SANTA CRUZ
ORURO
CHILE
POTOSI
CHUQUISACA
TARIJA
PACIFIC OCEAN
PARAGUAY
ARGENTINA


PROFILE
Feet MSL
19,812
18,288
15,240
13,716
12,192
10,668
9,144
7,620
6,096
4,572
3,048
1,524
MSL
ZONES:
COLD
ARID
TEMPERATE
SUB.TROPICAL
TROPICAL
ALTIPLANO
LA PAZ
ORURO
COCHABAMBA
ARICA
VALLEYS AND YUNGAS
TROPICAL LOWLANDS
SANTA CRUZ
SANTIAGO
CORUMBA
70°
69°
68°
67°
66°
65°
64°
63°
62°
61°
60°
59°
58