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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

EL SALVADOR: AGRICULTURAL DEVELOPMENT

RESEARCH, EDUCATION AND EXTENSION

A-XII-1

AID-DLC/P-1034

UNCLASSIFIED

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June 12, 1972

MEMORANDUM FOR THE DEVELOPMENT LOAN COMMITTEE

SUBJECT: El Salvador - Agricultural Development - Research, Education and Extension

Attached for your review are the recommendations for authorization of a loan in an amount not to exceed $4,000,000 to the Government of El Salvador to assist in financing the United States dollar and local currency costs of Borrower's agricultural development program.

Please advise us as early as possible but in no event not later than close of business on Tuesday, June 20, 1972, if you have a basic policy issue arising out of this proposal.

Rachel R. Agee
Secretary
Development Loan Committee

Attachments:
Summary and Recommendations
Project Analysis
ANNEXES I-VI

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CAPITAL ASSISTANCE PAPER June 12, 1972
AGRICULTURAL DEVELOPMENT - RESEARCH, EDUCATION AND EXTENSION

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* Not attached. See Cable State 057638 (Copy in Official Loan file, LA/DR).

PART ONE: SUMMARY AND RECOMMENDATIONS

1. BORROWER: The Borrower will be the Government of El Salvador represented by the Ministry of Agriculture and the National Planning Council. The Ministry of Agriculture will have the overall responsibility for the administration of the program in coordination with its executing agency, the Centro Nacional de Tecnología Agrícola (CENTA: The National Center for Agricultural Technology). CENTA was established in December 1971 as a semi-autonomous agency of the Ministry of Agriculture integrating El Salvador's agricultural research, education and extension services.

2. LOAN:

   a. Amount: Not to exceed US $4,000,000.

   b. Terms: Minimum statutory terms: amortization over a period of forty (40) years including a grace period of ten (10) years, with an interest rate of two per cent (2%) per annum during the grace period and three per cent (3%) per annum thereafter.

   c. Local Cost Component: Approximately US $1.85 million equal to 46% of the loan will be used for local currency expenditures.

3. BACKGROUND

During the period 1961-68 the growth of El Salvador's agricultural sector declined from an average annual rate of 6.7% during the four-year period 1961-64 to 1.4% for the period 1965-68. The cause of the stagnation of such a vital sector of El Salvador's economy was the principal problem addressed by the Ministries of Agriculture and Planning during the review of the five-year plan in 1968, as well as the reason for the agricultural sector analysis (1968-69) undertaken by the Ministry and the Robert R. Nathan Associated, under A.I.D. contract. The conclusion reached during the inter-ministerial review was that agricultural output could not keep pace with national needs for food and jobs for lack of technologies suitable for increased productivity of traditional domestic and export crops and for diversification into new labor-intensive crop production. The 15-month Nathan sector analysis identified

Exchange rate: US $1.00 : Colones ¢2.50

problems within the sector and defined reforms, programs, and policies to accelerate the growth of the agricultural sector as a whole. It recommended GOES long-term investment programs in crop diversification, irrigation and drainage, marketing and crop storage, and complementary infrastructure programs, and concluded that the success of such investments would depend upon a greatly expanded technological capacity in applied agricultural research, education, and extension, in addition to agricultural policy and administrative reforms in the Ministry of Agriculture. The analysis also recommended reform of land tenure arrangements (ownership and tenant relationships) and refinement of fiscal, credit and export policies to help the diversification effort. The Ministry has initiated many of these reforms and programs in the last three years.

First, to define future infrastructure investment programs, the Ministry undertook comprehensive land resource studies to analyze resource availability. The recently completed regional studies and feasibility studies of priority projects have provided the basis for GOES discussions with the IDB and IBRD concerning large scale irrigation and drainage programs throughout El Salvador.

Secondly, the Ministry has undertaken reform of public "autonomous" agencies in credit, marketing, land reform and irrigation and drainage.

Moreover, the Ministry has initiated legislative reforms for (1) minimum wages for coffee workers (1971); (2) establishing maximum farm sizes in irrigation districts and providing for Ministry expropriation and redistribution of excess holdings (1970); (3) guarantying tenant farmers a degree of tenure and constant rents (1972); and (4) expansion of low cost, long term credits from the Central Bank's Agricultural Development Fund (1969).

The Ministry appointed a special commission to analyze the need for the development of specialized agricultural technology in El Salvador and to design the institutional framework to effectively integrate agricultural research, education and extension.

The preliminary report served as a basis for continuing discussions between the Ministry and USAID culminating in the presently defined loan program to CENTA.

In 1971 the Mission contracted a PERT specialist to work with the directors of agricultural research, education and planning to program the orderly development of CENTA including all of its various components.

Also in 1971, the Ministry and USAID agreed to conduct a 10-week sector review, coordinated with the GOES 5-year planning exercise, of agricultural plans, analyses and programs developed to date. The purpose of the review was to identify and analyze the principal constraints in the agricultural sector and to examine the desirability, feasibility and content of a loan project which would serve as the initial portion of a sector program. The review was completed in March 1972 and provided the basis for the IRR submitted during that month for a US $6 million loan project program in agricultural research, education and extension and a regional grain storage and price stabilization program.

During Intensive Review legal and technical constraints were identified in the grain storage and price stabilization loan project requiring consideration beyond the time period available for FY 72 loan preparation. The Ministry assumed the responsibility with USAID support to carry out the specific technical and economic analysis to be conducted on this program as part of its continuing sector analysis program. The proposed loan program, therefore, encompasses assistance to the Ministry of Agriculture's continued analysis of the sector and to the expansion and improvement of research, education and extension - CENTA.

4. DESCRIPTION OF THE PROJECT

The proposed loan will assist in financing: the construction and equipping of new research facilities (laboratories, greenhouses, administration and office buildings, and a library) at the CENTA headquarters in San Andrés; the purchase of field equipment and vehicles for the research units; the construction and equipping of additional educational facilities (classrooms, field laboratories, and service facilities) at the CENTA headquarters; the construction of CENTA regional and supporting field offices; the purchase of demonstration equipment, training aids, and vehicles for the

extension field agents; a component of CENTA manpower training requirements; and the technical assistance needs of CENTA for final design and construction supervision, as well as, technical assistance to the Ministry division of Economic Analysis and Planning.

5. PURPOSE

The purpose of this loan project is to: (i) aid CENTA in the development of an applied research capability in labor-intensive and small farm crop production technologies; (ii) to improve GOES delivery systems for transmitting the accumulated applied research knowledge to the target rural farming (farm owner and farm worker) population to achieve improved living standards; (iii) to develop the critical mass of trained talent within the GOES necessary to accomplish technological transfers; (iv) to integrate research, extension and education activities within one action agency of the Ministry of Agriculture; and (v) to assist the GOES in the continued analysis of the country's agricultural problems and in the preparation and execution of new public investment projects for the sector.

6. LOAN FINANCIAL PLAN: 1973-76 (in thousands US $ or equivalent)

Purpose	Amount		
Ministry of Agriculture	GOES	AID	TOTAL
1) Economic Analysis and Planning			
a) Technical Assistance	--	100.0	100.0
2) CENTA - Research, Education & Extension			
a) Facilities	1,585.0	1,585.0	3,170.0
b) Equipment	--	1,150.0	1,150.0
c) Furnishings	163.5	163.5	327.0
d) Vehicles	--	774.0	774.0
e) Additional Admin. and Operating Costs	3,616.0	--	3,616.0
f) Training	--	100.0	100.0
g) Technical Assistance	--	120.0	120.0
TOTAL	5,364.5	3,992.5	9,357.0

7. OTHER SOURCES OF FINANCING

The Export-Import Bank, the IBRD, and the IDB all indicated that they were not interested in financing the proposed project (see Part Two Section IV F). The Borrower has also indicated to the Mission that appropriate financing of research, education and extension facilities was not available from the regional development bank, CABEI. Due to the nature of the project, other U.S. or free world sources of financing are not available.

8. STATUTORY CRITERIA

All statutory criteria for this loan have been met; Annex II contains the Statutory Criteria checklist.

9. VIEW OF THE COUNTRY TEAM

The Country Team in the CASP identified the development of the agricultural sector as essential to the furtherance of long-range U.S. interests in El Salvador. The Center for Agriculture Technology is viewed by both the Country Team and the Government of El Salvador as the first and crucial step in the modernization of Salvadoran agriculture.

The proposed CENTA loan coupled with on-going technical assistance will help the GOES develop the human resources and delivery systems needed by the agricultural sector. It will provide the essential technological base upon which successful programs in credit, grain storage and price stabilization, irrigation and ultimately land reform can be built. Furthermore, the program priorities which have been set by the GOES for CENTA are in complete harmony with U.S. objectives in the agricultural sector: the creation of additional income for small and medium farmers and the reduction of rural unemployment.

The GOES has given highest priority to CENTA and has requested U.S. assistance in developing the institution. The GOES has also stated that it is their intention to complement this program with a series of policy and institutional reforms in the related areas of land tendency, grain stabilization and credit. The Country Team therefore supports this project based on its own merits and as the first step in a longer-term , comprehensive agricultural sector program.

10. RECOMMENDATIONS

On the basis of the conclusions of the Capital Assistance Committee that the project is technically, economically and financially justified, it is recommended that a loan to the Government of El Salvador for an amount not to exceed US $4,000,000 be authorized subject to the following terms and conditions:

A. AID loan funds will be used to meet the United State dollar and local costs of financing: the training of CENTA personnel; the equipment, materials, and engineering services related to the expansion of the CENTA; and the technical assistance to be provided to the Ministry of Agriculture's Office of Economic Analysis and Planning.

1) Up to US $120,000 of the loan may be used to finance engineering design and supervision services to CENTA.

2) Up to US $100,000 of the loan may be used to finance training costs of CENTA personnel.

3) Up to US $100,000 of the loan may be used to finance technical assistance to the Ministry of Agriculture for economic analysis, planning and evaluation.

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

C. Other Terms and Conditions

1) Conditions Prior to Initial Disbursement

Prior to the first disbursement under the loan for the CENTA program the Loan Agreement shall require:

a) the appointment of the members of CENTA's Advisory Council by the Ministry of Agriculture;

b) the submission by CENTA of the completed PERT program which will serve as the implementation plan for the CENTA project and will include all construction, equipment, training and engineering services within the project.

2) Conditions Prior to Specific Disbursement

The Loan Agreement shall require:

a) Prior to disbursement for engineering services, CENTA will submit to AID a satisfactory contract for construction design and supervision services.

b) Prior to disbursement for [illegible] economic analysis and planning, the Ministry of Agriculture will submit an implementation plan for the utilization of mechanical services, as well as a satisfactory stage of work.

c) Prior to disbursement for the [illegible] central facilities or field units, CENTA will submit a plan and detailed schedule for all [illegible] work and satisfactory final plans, specifications and bidding documents.

d) Prior to disbursement for personnel training, Ministry of Agriculture and CENTA will submit a satisfactory training plan including [illegible].

e) Prior to the procurement of vehicles, the Ministry of Agriculture and CENTA will submit a plan for vehicle maintenance and replacement.

D. Covenants

In addition to the standard provisions, the Loan Agreement shall contain covenants to the effect that, unless AID otherwise agrees in writing:

1) The Ministry of Agriculture will continue to implement the Ministry-wide program of standardized salary scales and 5% annual salary increases.

2) In order to increase the efficiency of the Agriculture Extension program the Ministry will proceed to appoint a minimum number of 15 extension specialists.

CAPITAL ASSISTANCE COMMITTEE:

Regional Agricultural Advisor :	J. Halpin
Loan Officer :	R. Bloom
Agricultural Economists :	D. Weisenborn, P. Church, P. Hildebrand
Program Officer :	R. Nicholson
Engineer :	R. Gavidia
Agricultural Research Advisor :	D. Boynton
Agricultural Education Advisor :	H. Peirce
Agricultural Extension Advisor :	G. Chavez
Economic Officer :	C. Taylor

Approved by : J. P. Derum, Director, USAID/El Salvador

PART TWO: THE PROJECT

SECTION I - Project Description

A. Background

The A.I.D. loan to El Salvador's federation of credit unions and agricultural cooperatives (Fedecaces) authorized in FY 1970, was the only A.I.D. loan program in the agricultural sector since 1963 when an intermediate credit loan was undertaken which channeled credit to small and medium producers through the Central Bank and the Asociación de Bienestar Campesino (ABC - a supervised agricultural credit agency).

The technical assistance program to the GOES in recent years has been trying to find a more comprehensive approach to solving the problems of the agricultural sector. The emphasis of the AID/GOES strategy was to initiate comprehensive sector analysis and planning and to develop institutions capable of planning and implementing a program to (a) intensify land utilization, (b) diversify production, (c) increase employment in rural areas, (d) create alternatives to both subsistence farming and migration to urban centers, and (e) improve all aspects of marketing. A.I.D. technical assistance and training programs were designed to support and strengthen key agricultural institutions. R. R. Nathan Associates were contracted to conduct a comprehensive agricultural sector analysis.

The purpose of the Nathan study was to identify the principal constraints within the sector and to define the reforms, programs, and policies necessary to achieve the GOES goal of accelerating the growth rate of the sector from 3.5% experienced during the 1960's to 4.8 to 5.5% between 1970-90. The fifteen-month analysis concluded that to reach the growth goals the GOES would have to undertake a number of long term investment programs in crop diversification, irrigation and drainage, marketing and crop storage, and complementary infrastructure programs. The success of such investment, the study concluded, would depend upon a greatly expanded technological capacity in applied research, education and extension services, as well as, agricultural policy reforms and structural changes in the Ministry of Agriculture. The report recommended the reorganization of the MAG to increase its ability to implement programs, improvement of land tenure arrangements (ownership and tenant relationships), and refinement of fiscal, credit and crop

pricing policies to achieve the diversification to labor intensive crops that was indicated. Concurrently with the completion of the Nathan study, the GOES with Mission technical assistance established a commission to define the requirements of El Salvador's agricultural research, extension and education institutions. Major reforms were initiated in the Ministry of Agriculture which brought ABC (credit), IRA (marketing), DGRD (irrigation and drainage) under its control.

B. Project Development

In 1971, the Mission and the GOES with AID/W concurrence agreed that a joint 10 week sectoral review would be carried out which would indicate the desirability, feasibility and content of a possible project loan and which would serve as the initial portion of a more refined and comprehensive sectoral analysis.

On the basis of the sector review, the Mission and the GOES examined the feasibility of proceeding with an integrated program of agricultural credit, grain storage and agricultural research, education and extension. The credit component was postponed and an IRR was prepared for the first phase of the sector program in regional grain storage and price stabilization to be handled by IRA and agricultural research, extension and education to be managed by CENTA. The IRR for the loan proposal was approved by the CAEC in March, 1972.

During intensive review the Mission and GOES, assisted by a TDY consultant from the USDA, identified legal and technical constraints in the area of grain storage and grain price policy which must be resolved prior to initiation of a program in this field. The grain storage and price stabilization program therefore could not be considered for inclusion in this loan proposal by the Mission. Preliminary agreement has been reached between the IRA, the Ministry of Agriculture, and the Mission regarding the legal and technical work to be undertaken with IRA and a plan for necessary technical assistance is being reviewed. As a part of the continued sector analysis, the IRA project will be developed by the Ministry and the Mission for inclusion in the next phase of the development program.

The loan project of financial and technical assistance, complemented by grant technical assistance and training from AID and other international agencies, is the first phase of an evolving sectoral program in El Salvador's priority agricultural sector. Loan assistance to CENTA will assist in the development and integration of three critical functions necessary for the long term development of the agricultural sector. Also, the loan will provide technical assistance to the MAG to continue the analysis of the sector to identify additional constraints within the sector, to refine their sector strategy and policies, and finally to elaborate the projects and programs which must be undertaken.

During the Intensive Review of the CENTA program it was found that preliminary cost estimates for the buildings, laboratories and equipment were understated. With a contingency factor of 15% built into the cost estimates the revised sum of equipment and construction is US $5,430,000 of which the loan will finance US $3,680,000. In addition, at the request of the Ministry, US $320,000 have been included under the loan to finance technical assistance costs, training costs and engineering design and supervision costs. Vehicle costs remained the same as presented in the IRR. The total amount of the proposed loan is now US $4,000,000.

In the development of the loan program the Mission drew upon the analyses prepared by private consultants (the PERT analysis and the sector analysis), the ROCAP agricultural economist who assisted the Ministry analysts prepare the sector review, as well as TDY assistance from AID/W.

C. Loan-Funded Components

The project is the first phase of anticipated further sector lending to the GOES to develop and strengthen its participation in developing the country's agriculture. The loan will provide funds for the construction of research and education facilities at CENTA headquarters and regional and supporting extension stations. The project will provide funding to equip the buildings and will provide vehicles to ensure the efficient operation of CENTA. The loan will allow the expansion of the research programs with the prime objective to identify the labor-intensive crops that can be produced in El Salvador. The improvement of the extension program will allow that service to more effectively carry the results of

the research work to the producer. The loan will finance the expansion of teaching facilities with a consequent increase in the number of students being prepared as practical agricultural technicians. The project will also assist in funding the continuing agricultural sector analysis to be carried out by the planning section of the Ministry of Agriculture and provide funds for participant training.

1. Construction

CENTA requires additional research facilities, classrooms, library, dormitories, livestock facilities and regional agricultural centers in order to more effectively address the problems of the rural sector of El Salvador. The cost of this construction is estimated to be US $3,170,000 with half of that amount or US $1,585,000 to be financed under the loan. The balance will be financed by GOES through regular appropriations to CENTA.

2. Equipment and Vehicles

In order to provide the necessary administrative and laboratory equipment, field equipment, vehicles, training aids and educational equipment required for successful implementation of the program, the project will finance the total cost of approximately US $2,251,000 of which the loan will finance US$2,090,000.

3. Technical Assistance

The Mission has identified the need for technical assistance to the GOES over and above that available under grant funds. This project will loan finance the contracting of consultants to assist in the on-going sector study of the agricultural sector within the planning section of the Ministry of Agriculture. The cost of consultant services required for final design and supervision of construction of facilities will also be loan financed by this project. The total cost of loan financed technical assistance will be $220,000.

4. Participant Training

The Ministry of Agriculture and the divisional directors of CENTA have developed a five-year projection of the training requirements of the Center. The plan summarized in Annex II Exhibit A calls for 98 CENTA employees to receive B.S., and advanced degree training and 60 to attend short-term specialized training programs over the next five years. The total cost of this training is

estimated at approximately $880,000. A.I.D. grant funds will be used in FY 1972 and FY 1973 to finance both short-and long term training. After FY 73 AID funds will be reserved for advanced degree or post-graduate study. It is anticipated that total AID grant funds available during this period will be ($343,000 total) to finance approximately 62 trainees. The remainder will be financed by the other donors or directly by the GOES using its own funds and the $100,000 in loan funds allotted for this purpose. Other agencies provided 107 man/months of short-term training and 6 long-term participant grants during 1972. It is anticipated that this level will be maintained and increased moderately over the life of the project.

The long-term training needs of CENTA will be identified during the completion of the PERT and reviewed by an AID/CENTA committee. Periodic meetings with the other agencies will be continued to assure maximum coordination.

All CENTA participants sponsored by the GOES and AID are obliged to sign a contract to return to CENTA and work a minimum of two years for every year of training received.

D. Grant-Funded Technical Assistance

1. Agricultural Sciences and Administration

The Mission in FY 1971 reorganized and strengthened its grant-financed technical assistance program in anticipation of the establishment of CENTA and in recognition of the need for long-term aid to the new institution. The technical assistance staff in agriculture has been increased from six to fourteen direct-hire and contract personnel and the participant training program also increased. The Mission contracted the University of Florida to provide five senior agricultural scientists to act as advisors to the research departments of CENTA and facilitate inter-departmental coordination between research, education and extension. A USDA/PASA agreement also provides two technicians to CENTA. These advisors, are charged with helping the department chairmen evaluate on-going research, identify new research priorities, plan research activities, and develop long-term technical assistance and training projections. In addition, they provide guidance in their area of expertise to the agricultural school, assist in curriculum development, plan field training and from time to time act as guest lecturers.

AID has three technicians (2 USDA and 1 Florida) working with CENTA as advisors to the Director of the National Agriculture School, the Director of Research and the Director of Extension. It is their responsibility to coordinate the activities at the departmental level, encourage interdepartmental planning, and advise the three Directors and the Director General on overall goals for CENTA, its institutional development requirements and appropriate program emphasis.

The Ministry of Agriculture has prepared a five-year projection of the technical assistance and training requirements of CENTA. The plan is summarized in Annex IV , Exhibit A . Although both the Ministry and AID consider this a planning document and subject to continued refinement, it does reflect the immediate priorities for CENTA and an accurate guide for AID and other international agency assistance to CENTA.

There are 4 foreign technicians provided by FAO, OAS, and the British Government now working at CENTA and the GOES is actively seeking additional help from these and other sources. The Peace Corps presently has three volunteers at CENTA and is projecting a team of 12 for 1973 to work on vegetable production and marketing at the zone level.

Training grants provided by the other donors to the Ministry of Agriculture totalled 26 in FY 1972 many of them directly to the CENTA agencies. These included 6 academic scholarships and numerous short courses financed by Israel, Spain, Holland, France, FAO and the United Nations.

2. Planning, Analysis and Evaluation

The A.I.D. agriculture strategy includes strengthening the analysis, planning and management capabilities of GOES agriculture institutions. As a part of the program the Department of Economic Analysis and Planning of the Ministry of Agriculture will with loan funded assistance develop an evaluation plan to measure achievement performance of CENTA itself (e.g. increase in numbers of soil samples analyzed, extension bulletins published, field seminars conducted) but also the impact of the CENTA through its field extension service on the economic welfare of the target rural population to be reached with income and employment creating cultivation practices.

The preparation of this first phase loan to agriculture in El Salvador represents a significant turn-around in GOES sector analysis and planning. Previous analysis has been conducted by foreign consultants with only modest Salvadoran man-power inputs and the sector analysis, as such, did not become a continuous analytic process nor was there widespread distribution to local policy makers and technicians. Past planning exercises have been conducted largely by the National Planning Council (CONAPLAN) without involvement of those Ministries or agencies responsible for plan implementation; the last Five-Year Development Plan 1968-1972 was developed almost entirely by CONAPLAN with little consultation from the other ministries including Agriculture. Frictions between the two agencies caused by lack of communication and coordination reduced the five year plan to an academic exercise. Few of the goals for agriculture in that plan were met.

The Ministry of Agriculture has learned from these experiences. The present Five-Year Development Plan 1973-1977 is being prepared almost exclusively by the Ministry under the supervision of CONAPLAN. The Ministry, despite its commitments of man-power to the Five-Year planning exercise, also fielded an analytical team to launch with A.I.D. the ongoing sector review which has led to the CENTA loan project -- and further down the road to possible "phase II" projects in marketing and credit. The reform legislation, reorganization and PERT planning of CENTA were all developed within the Ministry of Agriculture.

Where GOES capabilities in analysis, planning and management are weakest A.I.D. anticipates providing AID grant technical assistance, as well as, some loan funded technical assistance. Specifically A.I.D. anticipates:

1. A full time direct hire agricultural economist to assist the GOES in an ongoing sector analysis which will indicate where other sub-sector requirements -- in credit, marketing, land reform etc. -- must be met to achieve loan goals.

2. A full-time contract (U. of Florida) farm management specialist, to help CENTA establish research and extension priorities among agricultural practices based on the economic welfare goals of increased employment, incomes, export earnings, domestic food production and others established by the El Salvadoran Five-Year Economic Development Plan (1973-1977).

3. Short-term TDY consultation of a PERT specialist to assist CENTA management in long-run planning. Already the USAID has used 100 man-days of PERT specialist time to aid the GOES in drawing up flow charts of CENTA for the next five year period. Additional time is anticipated to aid in modification of PERT charts and continue on-the-job training of the people responsible in CENTA and the Ministry for planning and implementation.

4. Short-term TDY assistance both U.S. and other (CACM) as required to the Ministry Department of Economic Analysis and Planning to solve particular analytical problems such as projecting credit needs, evaluating the impact of extension services, assessing Central American Common Market impact on El Salvadoran agriculture, defining the goals and assisting in the design of sub-projects within the sector (e.g. marketing and credit).

5. Participant training - The A.I.D. Mission already has selected two candidates for long term (Masters Degree) training in the U.S. beginning in the fall 1972 in agricultural economics. Short courses in project design and analysis and in sector planning are also anticipated either in Washington or the region. A proposed regional program for IICA-A.I.D. assistance in agriculture sector management will also be drawn upon.

In addition to IICA, the A.I.D. Mission will continue to encourage the GOES to turn to other multinational organizations offering assistance to agriculture sector analysis, planning and management in the region. Opportunities presently exist to draw on the IDB loan funded feasibility study program, as well as, grant assistance through SIECA, the Secretariat of the Central American Common Market, which is working on improving the coordination of public sector agriculture institutions. El Salvador is already working with the IDB and SIECA on an inventory of agriculture sector investment projects (e.g. San Isidro Irrigation project) as part of its five-year planning exercise. Considerable analysis must be done to prepare these investment projects for foreign financing. The GOES has also been working with the FAO and SIECA in making demand and supply projections for agricultural commodities; liason with the FAO-SIECA group is planned to continue the refinement of research and extension priorities of CENTA in crop diversification.

E. Financial Plan - 1973-76 (in thousands of US$). The cost of the program assisted by the proposed A.I.D. loan will be financed as follows:

Purpose of Financing	Sources of Financing and Amounts		
	GOES	AID LOAN	TOTAL
CENTA			
1) Research			
a) Facilities	885.0	885.0	1,770.0
b) Equipment		620.0	620.0
c) Furnishings	112.5	112.5	225.0
d) Vehicles	--	215.0	215.0
2) Education			
a) Facilities	162.5	162.5	325.0
b) Equipment		105.0	105.0
c) Furnishings	7.0	7.0	14.0
d) Vehicles	--	9.0	9.0
3) Extension			
a) Facilities	400.0	400.0	800.0
b) Equipment		75.0	75.0
c) Furnishings	21.0	21.0	42.0
d) Vehicles	--	550.0	550.0
4) Administration			
a) Facilities	137.5	137.5	275.0
b) Equipment		350.0	350.0
c) Furnishings	23.0	23.0	46.0
d) Additional Administration and Operating Costs	3,616.0	--	3,616.0
e) Technical Assistance (Engineering)	--	120.0	120.0
f) Training	--	100.0	100.0
MINISTRY OF AGRICULTURE			
Economic Analysis & Planning			
a) Technical assistance		100.0	100.0
TOTAL	5,364.5 (57%)	3,992.5 (43%)	9,357.00 (100%)

1. Total Financial Requirements

A.I.D. loan financing represents 43% of the investment and additional administrative and operational costs of the expanded CENTA program. Approximately US$1.85 million or 46% of A.I.D. loan resources will finance local currency costs related to construction, procurement of furnishings and engineering technical assistance. Local currency financing under the loan represents approximately 20% of the project costs elaborated in the financial plan above.

The total financial requirements of the CENTA program during the period 1973-76, including all administrative and operational costs and investment costs, will be approximately US $20.0 million (See Financial Analysis Part 4 Section II). The proposed A.I.D. loan to finance investment expenditures, as well as, technical assistance and training will represent nearly 20% of the total program costs and comprise nearly two-thirds of the total investment expenditures.

2. Local Contribution

Total GOES contribution to CENTA program over the 1973-76 period is estimated at approximately $1.75 million for complementary investment financing indicated in the financial plan above, as well as, $13073 million for total administrative and operating costs during the period--$3.616 million of which is strictly for additional administrative and operating costs required for the expansion of CENTA program. (See Financial Analysis, Part 4, Section II D).

This project is one component of a rural development program to which the GOES is committed (See GOES Agriculture Strategy Part 2 Section II). Projected investment expenditures are directed to long-term development programs in agriculture, education and rural infrastructure. The GOES has demonstrated its willingness and capability of generating additional internal resources and of responsible utilization of international borrowing to undertake necessary programs in development areas to which it gives high priority. Past performance in funding development of education is an example. To maintain the momentum of long-term development programs in past three years, the Central Government has increased internal borrowing through issuance of government bonds from a total of $3.7 million in CY 1970 to US $9.2 million for CY 1972. During the same period, Central Government long-term external borrowing increased from US $5.0 million in 1970 ($15.4 million in 1971)

to a projected level of $18.0 million in CY 1972. To sustain GOES development efforts, and to direct their efforts to new priority sectors such as agriculture, further borrowing will be necessary. The GOES is willing to absorb the costs for these investments over the long maturity period before added productive resources can contribute to economic expansion.

The USAID has received a formal loan request from the Ministry of Agriculture, the National Planning Council and the Ministry of Finance which sets forth the priority of the project within the context of the GOES development plans and the GOES commitment to meet counterpart requirements reflected in the financial plan for investment and administrative costs of the program. (See Annex I, Exhibit B).

SECTION II - PROJECT JUSTIFICATION

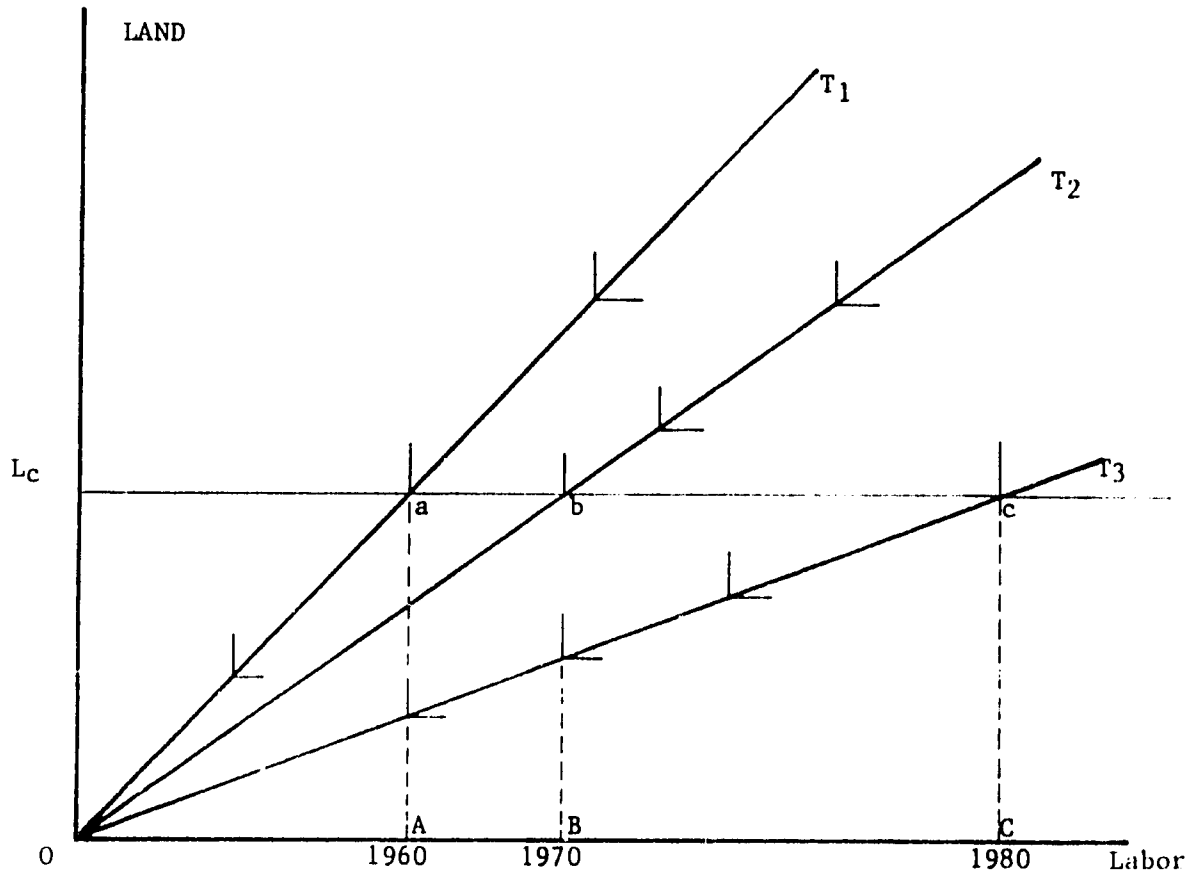
A. Project Rationale

El Salvador lacks an agricultural technology consistent with its endowment of man and land resources. (The analyses from which this conclusion is drawn include the Robert R. Nathan, Sector Analysis and the AID/MAG sector review listed as supplementary documents to this Loan Paper). At present El Salvador is trying to sustain agricultural production and employ a rural work force using a technology that requires factor proportions characteristic of economies with relatively abundant land and capital resources compared to labor. No such technology could be more ill-adopted for El Salvador, a country that with the exception of Haiti is unmatched in Latin America for its high man/land ratio.

El Salvador's agricultural technology problem can be easily conceptualized in the following Diagram I. On the two axes El Salvador's land and labor are represented. The solid line L_c represents the maximum amount of available cultivatable land in El Salvador. The rays (T) represent different agricultural technologies each utilizing more labor in relation to land in ascending order T_1, T_2, T_3. The diagram indicates that using technology T_1 all cultivatable land was necessary to employ the labor force available in El Salvador in 1960. Assuming no increase in land, the labor force available ten years later would require a new relatively more labor-intensive technology T_2 to be fully employed. If only technology T_1 existed in 1970,

DIAGRAM I

El Salvador - Choice of Technologies in Agriculture



T_1, T_2, T_3 = Available Agricultural Technologies

L_c = Available cultivable land

the share of the labor force left unemployed would be [illegible]. Similarly, technology T_3 would be required to fully employ the available labor force in 1980 given no change in cultivable land area.

The diagram underscores El Salvador's dilemma: with no farmland open for expansion of cultivable land, with industry and urban migration only able to relieve slightly the available agricultural labor force, and with the population control program still many years away from having an impact, the country must develop and introduce new labor-using technologies if its unemployment problems are not to worsen beyond politically or socially acceptable limits.

The impact on job creation in agriculture of a "proper choice" of agricultural technologies can be illustrated by a comparison of strategies of reaching full employment of the available agricultural labor force within a five year period. (See Annex IV Exhibit 5 for a more detailed discussion drawn from the 10-year sector review.) By dedicating available workers to the multiple-cropping of vegetables, some 129,000 hectares of land and $66.0 million of agricultural credits would be required. Alternatively, if the same workers were employed in pasture land and cattle production 3.1 million hectares of land and $620.0 million credits must be provided. El Salvador has neither the land available to dedicate its workforce to labor extensive cattle production nor the technology or marketing capacity for labor intensive vegetable crop production. Admittedly, neither of the two extremes is suitable for El Salvador but the comparison illustrates the range of impacts on land and labor utilization that the choice of technologies provides. The mix of crop and cultivation practices is the proper technological package to be sought. A well planned, well executed applied research program will be needed to develop that package.

It should be added that the applied research program must also stress technological advancements in basic grain-corn production. Basic grains are produced on much land suitable for labor intensive crops. Technologies to raise grain yields must be developed if land is to be shifted to labor-intensive crops without reducing total national grain output to feed the country.

Technologies to boost basic grain yields must be developed and introduced also to meet growing domestic food demands. In 1976/77 basic food crops were produced on 637,750 hectares which is approximately

the upper limit of land adaptable to crop production in El Salvador. (Current production levels, land use, and yields of crops in El Salvador are compared in Annex IV Exhibit C). By 1980, assuming no yield increases, it would require an additional 247,000 hectares or a 39 percent increase in area cultivated to produce enough of these crops to meet the projected demand. Estimated requirements for beef and milk by 1980 are 125% and 82% above current levels respectively, requiring a doubling in area - presently 665,000 hectares in pasture - devoted to cattle if present methods of production are continued. In order to meet 1980 internal demand without change in productivity and present usage patterns, an additional 912,000 hectares or a 70% increase in cultivable land above present availabilities would be required. This is obviously an untenable solution because all of the arable land in El Salvador is currently used for some form of agricultural production.

The decision to stress labor intensive crops such as fruits and vegetables can have a significant effect on the trade balance of El Salvador. El Salvador currently imports 1,284,165 quintals of fruits and vegetables annually with a stated value at the El Salvador border of $3,489,714 (based on an average of 1965-70 data). The wholesale value of these commodities at San Salvador is about $7,000,000 annually. Detailed data on farm production in El Salvador exist for 9 major fruit and vegetable imports which represent about 60 per cent of the total imported volume. Examination of the data indicate that each of these crops can be grown competitively by producers in El Salvador given sufficient technical knowledge and assistance. If these products were produced domestically it would result in import savings of $2,084,233 (or $4,168,466 depending on the value figure used) annually. Additional research will identify other crops of this type as well as potential new export commodities including nuts, herbs, and spices.

The diversification effort will not only have a significant effect on employment, income and nutrition, but, in addition, is a crucial factor in providing alternatives to the production of grains and beans. Currently, the production of these crops has increased to the point that El Salvador is self-sufficient in each. As surpluses begin to appear, the prices will fall and producers will experience income decreases unless they can concurrently increase production. In the absence of alternatives, the poverty picture will become worse rather than better. Increased production of basic foods will lower consumer food prices. This pattern has already begun in the basic grains and beans which are consumption

staples. In addition, it will be possible to provide lower priced fruits and vegetables to consumers as the diversification efforts expand and relatively high priced imports are eliminated.

B. Project Timing

The decision to select strengthening CENTA's research, extension and education capabilities as a first phase of A.I.D. sector lending for agriculture in El Salvador, followed from a review of the country's development goals and present economic structure.

The AID/MAG sector review attempted to identify how external resources might have the greatest economic impact in Salvadoran agriculture. "Economic impact" was defined in terms of GOES economic goals of expanded food production, increased rural labor employment, import substitution, diversified exports, and more equitable income distribution which were taken from the 5-year planning exercise currently underway by CONAPLAN and MAG. The analysis paid particular attention to the problem of maximizing rural employment and establish a ranking of those crops and cultivation practices which would provide the most jobs. (The Analysis "The Cost of Creating Jobs in El Salvadoran Agriculture" is a supplement to this loan paper).

Of all the constraints on job creation in agriculture, the analysis indicated that the present status of El Salvador's research, extension and education activities was the greatest. While an inventory of knowledge exists in corn production and is being developed for beans, there is lacking an adequate system for delivering this information to the large pool of farmers employed in traditional cultivation of these crops. Potential for employing large amounts of salaried workers in labor-intensive vegetable and fruit crops is lost because the research base does not yet exist to develop these crops. There is little information available indicating which labor intensive crops are most suitable to El Salvador growing conditions and problems of disease and insect control have to be solved. Highly efficient cultivation practices such as double and triple cropping patterns on irrigated land are still in the experimental stage in El Salvador. Not only is this knowledge indispensable to maximizing labor creation in agriculture but it also requires the most lead time to develop.

The CENTA project, then, calls for applied research on those crops and cultivation practices that have the greatest promise for providing jobs. At the same time the CENTA project will strengthen capabilities for delivering production techniques already available in those basic grains where the bulk of small farmers are presently

employed. Once the CENTA project is underway, complementary projects in credit, marketing and land reform will be designed for further financing. The 10 week sector review team also examined the extent to which the other factors were constraints to maximizing employment from a given amount of AID financing.

1. Irrigated land. Given that many labor-intensive crops have particular water management problems, it was a concern that there might not be irrigated or drained land available for their cultivation. An examination of the present 15,000 hectares of drained and irrigated land revealed, however, that only a few hundred hectares were presently being cultivated with these crops. The vast majority of land under irrigation remained in traditional grain crops, or worse, was used for extensive cattle grazing - the cultivation practice with the least labor input per unit of land. Moreover, irrigation projects planned for completion in the next five years would provide an additional 12,000 hectares of land for labor intensive crops. Irrigated land, therefore, was not considered an immediate constraint for providing new jobs in agriculture.

2. Production Credits. Capital is limited and credit institutions are inadequate in El Salvador. Nevertheless, the evidence gathered in a short study entitled the "Structure of Agricultural Credit in El Salvador", reveals that in the short run credit could be channeled into labor-intensive crop production where there is demand and evidence of financially solid projects. Several million dollars of agricultural credits have been available to El Salvador from international lending agencies for the type of medium and long term sublending to farmers required for diversification into labor intensive crops. Much of this money is unused; the IDB had to deobligate part of one of its loans. The causes for lagging disbursement appear traceable to both the lack of development mentality in the banking system and poor distribution of land ownership which precludes borrowing by many potential farmers. While both of these problems will require legislative changes, there is still a group of farmers that could be reached with available funds for cultivation of diversified crops in the short run.

3. Land Tenure. El Salvador's land tenure structure, which is characterized by a large disenfranchized small farmer renter system, is a disincentive to the type of investment required in the cultivation of labor intensive crops. Land tenure reform legislation recently enacted by the El Salvadoran Congress promises to alter this

situation (See discussion in Part 3 of this paper). In the short-run, however, the Nathan Sector Analysis reveals that there is enough land in small and medium farms to justify immediate efforts at promoting labor intensive crops. Interestingly, even on the small amounts of suitable land that have been redistributed under past land reform programs, traditional cultivation practices continue to dominate.

4. Markets. The access to markets - domestic and foreign - for producers of traditional and new farm crops is a major constraint to creating jobs in agriculture. Some problems such as low domestic purchasing power and limited consumer acceptance will require long-run solutions involving basic changes in the national economy. More immediate changes are possible through financing market facilities available to or in the hands of farmers. In the case of basic grains, a regional silo program is being developed as a possible Phase II of A.I.D. lending to El Salvador agriculture. At present a $6.1 million BID loan is financing retail and wholesale markets in San Salvador and should contribute to improving the market system for perishable food commodities including fruits and vegetables with high labor inputs. A more immediate problem to be addressed in the loan itself is ignorance about the demand for and marketing requirements of new crops for export. Particular stress will be laid on penetrating barriers to external markets for those crops offering the greatest demand for labor.

This project does not ignore these disincentives to the adoption of the labor-intensive technologies to be developed and introduced by the CENTA. Rather, through supporting the MAG in its ongoing sector analysis, planning and evaluation efforts, the loan project will encourage prompt attention to overcoming these disincentives through future public investment projects in agriculture. These investment projects themselves could involve additional AID lending in future phases of our assistance to the sector.

SECTION III - Project Goals and Evaluation

A. Project Goals

Increased employment, incomes and output from El Salvador's land and labor resources are the economic goals of this loan project. The project will help the development and introduction of agricultural technologies to employ the roughly 20,000 new rural job seekers each year and to raise output of basic food production (largely basic grains) at rates high enough to satisfy domestic demand while releasing some scarce land for new labor-intensive crop production for domestic and foreign markets. The farming population (farm owner, tenant farmer and farm worker) reached by the loan will enjoy higher income through production of high value crops and reduction in per unit costs of basic crops possible from adopting yield increasing practices. Some real income gains will be shared with urban consumers through lower food prices.

B. Project Evaluation

GOES performance in achieving the project goals can be measured in terms of increased employment, incomes and agricultural output both total and per unit of land and labor. The GOES, with AID supervision, will conduct periodic monitoring of progress toward these goals. Using benchmark data based on farm-level surveys conducted at the outset of loan implementation, the Ministry will measure changes in the structure and technologies of agricultural production introduced by CENTA.

Job creation stimulated by the loan would be calculated from a comparison of labor requirements of new and old crops and cultivation practices in a sampling of farms before and at periods after loan implementation. The net increase in job creation from the sampling of farms could then be projected to include all farms reached by the program. Similarly, based on cost and yield comparisons, total net income and yield changes attributable to the loan could be calculated.

SECTION IV - SPECIAL STATUTORY CONSIDERATIONS

A. Effect on El Salvador's Balance of Payments

The loan, through helping to diversify crops for export and to increase the production of commodities currently being imported, should have a positive effect on El Salvador's balance of payments. In 1969/70 net food commodity imports totaled $28 million or 12 per cent of the country's total import bill; moreover food imports have been growing at an annual rate of 9% in recent years, faster than the growth of total imports. The Ministry of Agriculture has estimated that this growth rate of food imports could be reversed in three to five years and that El Salvador could then begin to reduce the total value of food imports by 25% below present levels. The loan would help achieve these projected reductions in food imports through financing the technologies to increase crop yields providing enough agricultural output to displace imports and expand exports. Of course, to the extent that imports of farm machinery, fertilizer and Ministry vehicles and equipment are required to stimulate agricultural yield increases, the positive effect of the loan on the balance of payments is dampened. On balance, however, there is no evidence to contend that El Salvador will not be able to generate enough foreign exchange as a result of the loan to meet debt repayments.

B. Impact on U.S. Economy

The procurement of vehicles and much of the laboratory equipment will increase exports from the U.S. Indirectly, much of the fertilizer, pesticides and other technological inputs will also be purchased from the U.S. as will the spare parts for the vehicles and other supportive equipment.

Approximately $2,000,000 of the loan will be for equipment, vehicles and supplies to be purchased in countries under code 941.

The direct procurement in the U.S. and in countries under code 941 of equipment, supplies and vehicles will create additional exports from the U.S. It can be anticipated the major portion of the purchases will be supplied by the U.S. because of the availability factor. Additional U.S. exports will be generated in the future because of the need for compatibility of supplies and replacement parts.

C. Consistency of Loan with Regional Integration

As a participant in the Central American Common Market, El Salvador is committed to the advancement of regional agricultural integration based on the principle of comparative advantage. The loan project does not conflict with this regional commitment.

The loan project is focused on improving yields on land already under production and not on increasing cultivated acreage. Moreover, technical and loan assistance in crop production is to concentrate on those areas identified as suitable according to studies conducted by IICA, and by the Ministry of Agriculture which take into account comparative advantages not only among Central American countries but of regions within the country. This loan project seeks to develop and introduce technologies that will enable producers to shift their limited land resources to those crops and regions where yields are most favorable. Rather than stimulate more production of basic grains, the loan stimulates more efficient production - on less land - of existing grain output, thus releasing land for the cultivation of new labor intensive-crops.

D. Consistency with CIAP Review

The loan proposal is consistent with the findings and recommendations of a subcommittee of the Interamerican Committee for the Alliance for Progress which conducted its most recent review of El Salvador in November 1971. The subcommittee concluded that El Salvador must address the imbalance in the distribution of benefits of economic growth and undertake reform within the agricultural sector to carry out irrigation, drainage and other agricultural development projects within an integrated agricultural development scheme. El Salvador has initiated and is continuing the analysis, refinement and elaboration, within a sector context, of integrated programs directed towards the income and employment problems of the rural sector. The development through this proposed loan project of an agricultural research program focused on labor intensive cash crops, integrated with an expanded agricultural education and extension system to transfer this technology to small and medium sized producers is the first phase of such a program.

In reviewing progress in the agricultural sector, the subcommittee noted that some advancement has been recorded with the continuation of the Zapotitán irrigation and drainage project and improved cotton and grain harvests, but that a greater effort should be made towards diversification of production. The proposed project is intended to promote diversification of production by the develop-

ment of a research base in non-traditional crops and to assist small and medium producers in the application of this technology.

E. USAID Director's Certification

Annex I to this Capital Assistance Paper contains the USAID Director's certification for this activity in conformity with FAA Section 611(e).

F. Opinions of Other International Institutions

The Export-Import Bank in its minutes of April 14, 1972, stated that it was not interested in the loan due to the local currency financing and the concessional terms required.

The International Bank for Reconstruction and Development advised A.I.D. on April 17, 1972, that it was not interested in financing the project. The IBRD signed a US$4.9 million loan with the Ministry of Education in June 1969 to assist the GOES in the expansion of the secondary school system, as well as technical schools. Approximately US$600,000 of the loan are being utilized to expand the educational facilities at the Escuela Nacional de Agricultura (ENA) which has now been integrated into the CENTA agency. Loan resources are being used to assist in financing the construction of four dormitories, classrooms, a part of the school's livestock facilities and farm machine shops. The proposed A.I.D. loan program will complement the work being done through a limited expansion of classroom and communication facilities at the school, as more fully explained in Part 4, Section V.

The Inter-American Development Bank on June 1, 1972 similarly stated that it was not interested in financing the proposal. The IDB has recently authorized a US$1.5 million loan for rural water systems and is considering a GOES request for assistance to undertake a large scale irrigation project in northeast El Salvador estimated to cost US$12.0 millions and which would encompass 4,000 hectares. The proposed project will emphasize small farmer intensified farming, as well as, improvement of bean and livestock production in the area. The new irrigation "district" to be established by the Ministry of Agriculture will be included under El Salvador 1970 law of Irrigation and Drainage and so allow the Ministry to set minimum and maximum standards for land holdings in the area and empower the Ministry to expropriate land held in excess of the maximum levels. The proposed A.I.D. loan program with CENTA complements major investments of this type as it assists in the expansion and improvement of the technological base for crop diversification and multiple crop farming and it will assist in the integration of the work being done in agricultural engineering and the research on irrigation farming.

PART THREE: THE AGRICULTURAL SECTOR

SECTION I - The Agriculture Sector Analysis

A comprehensive analysis of the Agriculture Sector in El Salvador was conducted by Robert R. Nathan Associates in 1969 and by a MAG/AID Team in 1972. The studies that resulted from these analyses are included as supplementary documents to this loan paper. The following discussion draws from the sector analyses to focus on the major problem areas receiving attention in GOES and AID agriculture sector strategies and in this loan project.

A) Structure of the Sector

The agriculture sector is a key component of the El Salvadoran economy contributing 1/4 of the Gross Domestic Product (GDP), employing 2/3 of the economically active population, and producing 3/4 of the country's exports (see Annex IV Exhibit D for a description of the national economy). However, rural incomes are less than one-half of the national average and illiteracy, malnutrition, and mortality rates are much more pronounced among the agricultural population. Access to credit, markets, technical assistance and other services necessary for an efficient agriculture are also greatly limited in rural El Salvador.

The present structure of agriculture precludes the sector from either making an adequate contribution to growth of domestic food output and foreign exchange earnings or providing more jobs and better incomes for the country's large rural population. Historically, the structure of El Salvadoran agriculture has been conditioned by the country's dependence on a few export crops - coffee, sugar and cotton - as foreign exchange earners, and a few basic grain crops - corn, sorghum, beans and rice - grown for domestic consumption. This "dual" agricultural economy served the country "adequately" as long as population pressures were mild, income levels were low, and national aspirations were passive about a more equitable distribution of national output and access to land and capital resources.

This situation has changed. Population growth rates have placed El Salvador ahead of all countries in the hemisphere - with the exception of Haiti - in the concentration of manpower to productive land

resources. Moderately growing per capita income levels and broadening education and literacy programs, have raised national aspirations for better living conditions. A "population" war with Honduras in 1969 served to underscore the urgency of getting agriculture moving in El Salvador.

The 1971 Population Census recorded El Salvador's population at 3,541,000 (2,610,000 rural) and growing at an annual rate of 3.4 percent. Population is reflected in the fact that 75% of the national territory is presently included in farms, a proportion far exceeding that for the other Central American countries. (See Table I).

TABLE I
Central America: Comparative Population Density

Country	Population per sq. km.	% Territory in farms	Population per sq. km. of farm land
El Salvador	169	75.3	224
Guatemala	48	31.7	151
Costa Rica	36	52.5	69
Honduras	25	21.6	116
Nicaragua	14	27.5	51

The land area utilized in 1970 for permanent, semi-permanent, and annual crops was 631,887 hectares or 30 per cent of total land area. (See Annex IV Exhibit E). The traditional export crops, on which El Salvador depends for its foreign exchange earnings, currently utilize 226,586 hectares or 36 per cent of the land in crops. This leaves only 405,301 hectares of land for the production of the basic grains and other food crops and represents a population density of about 9 people per hectare of land in basic food crops.

B) Major Problem Areas

1) Low Productivity of Land and Labor Resources

Lagging agricultural productivity is a general problem in El Salvador. In the past El Salvador has placed increased agricultural production ahead of improving the quality of rural life -- through high rural incomes as well as better social services -- by emphasizing production on larger farm units, which are more accessible and receptive

to technological change and which at best employ only a small share of the rural farm population as migratory or colono workers. Overlooked is the large population of small farmers or farm workers who, due to their illiteracy, tradition, poor social and physical infrastructure, inferior land resources, and isolation from the national economy, make up a large population very difficult to reach with productivity changing practices.

In the Nathan Report, it was estimated that product per man in 1966 was U.S. $414 in agriculture and U.S. $1541 in all other sectors. This means that the productivity in agriculture was about 1/3 that in the non-agricultural sectors. The Nathan analysis attributed this to very little use of modern production practices and insufficient investment. A comparison of farm budget data from El Salvador on corn grown under traditional methods and corn growing using hybrid seed, fertilizer, and insecticides indicates that yields in the first case are 15 quintales per manzana and 50 quintales per manzana using modern technology. Although data do not exist, the situation is undoubtedly the same with many crops produced in El Salvador. In some cases there is a lack of research in modern techniques but, in others it is a matter of not communicating the research results to the field. As an example of the failure of the system to provide for the adoption of new technologies, hybrid corn seed is currently being used by only about one third of the corn producers. In this case, the technology is available but has not been widely adopted.

2) Unemployment

An additional serious problem is unemployment and underemployment. The country's labor force increases by 30,000 job seekers each year of whom 2/3 are in the rural sector. In the period 1965-70, the annual average supply of labor in the agricultural sector was 150 million man-days but the demand was only 87 million. This means that average agricultural worker was employed only 149 out of 257 working days a year, or only about 58 per cent of his available time. Owing to the inability of the agricultural sector to keep up with increasing population, the number of days worked per worker per year has declined from 159 in 1965 to 146 in 1970 (see Annex IV Exhibit F). Resulting low rural incomes have prevented effective demand for agricultural inputs and consumer products thus retarding industrial expansion and off-farm job creation.

Underemployment of the land resources is also a problem. Most crop land is harvested only once a year when through the use of irrigation two to three crops would be possible. Moreover, underemployment of land is also manifested in the product mix, in El Salvador where basic grains are being produced on land which is capable of producing products of higher value such as fruits and vegetables. (Net returns from one manzana of corn using modern production techniques average $16.14 as compared, for example, with $84.99 in tomatoes). Although climatic conditions in El Salvador permit diversification from grains to fruits and vegetables, the problem has been one of inadequate technology and insufficient credit and marketing services to support such efforts.

Seasonality aggravates unemployment problems in El Salvador, affecting both the land and labor resources. First, the weather cycle results in definite production patterns which leave many land and labor resources idle for as much as half the year. The GOES has recognized this problem and has begun to develop various irrigation and drainage areas in the country which will allow full time use of the land. One of these projects, the Zapotitan Valley, involving some 5,000 hectares, is already operational but will require more research and extension to realize its potentials. Another irrigation project near San Isidro (north of San Salvador) has just been presented to IDB for financing and will involve some 5,000 hectares of land. (See Annex IV Exhibit G for detail on Zapotitán).

Existing data on the seasonality of labor demand show that over a six-year period 1965-70, the use of the existing labor supply varied from a low of 35 per cent in October to 100 per cent in November, with an average of 58 per cent throughout the year as indicated earlier. (See Annex IV Exhibit H for detail). This pattern can be broken in part by the establishment of the irrigation projects which will provide employment in slack periods, and also by the diversification effort combining crops with different seasonal labor and land requirements.

In addition to seasonality, another major contributing factor to underemployment is that of small farm units. At least half of the farm units in El Salvador are too small to provide full time employment to the operator given traditional crops and technologies. Although these small farms are usually intensively cultivated, the lack of modern techniques, and an adequate credit results in relatively poor use of the land and labor.

3) Antiquated Land Tenure System

Distorted land distribution and tenure patterns retard both increased productivity and employment. The Nathan Analysis reported that in El Salvador 85% of the land in farms is owned by only 10% of the farm operators (see Annex IV Exhibit I for more detail). Lack of land titles precludes many producers from obtaining agricultural credits and discourage adoption of improved practices, while the practice of land rentals is a disincentive for any land improvements. Approximately 25,000 rural families have been evicted from land they worked by sharp rental increases within the last four years. According to the MAG many of the families who were working marginal lands had improved their crop yield significantly with the assistance of the extension service and had their rents raised by owners who saw the opportunity to profit from the unexpected potential of their property. Also there was a desire by land owners to shift production to cotton and sugar which were receiving high prices in 1971. The MAG analysis conducted during past four years showed an approximate 100% increase in land rents during the period.

The GOES has attempted several land redistribution programs with varying degrees of success, but each were too limited in scope to provide a satisfactory solution. For example, the government has supported ICR (Instituto de Colonización Rural) since 1962 in efforts to resettle farm families. The effort has been largely unsuccessful because only about 3,000 families have been affected and they were generally put on land with little potential leaving them in about the same economic condition as before.

The most positive step which has been taken by the GOES with respect to farm tenure was the recent passage in early 1972 of the Agricultural Land Rental Law (Decree 509) which protects tenant farmers against the arbitrary practice of landholders to alter rental contracts. The principal provisions of the law, which will be in effect for one year, are: a) Rental prices for the crop year 1972-73 may not exceed those in effect for crop year 1971-72; b) rental prices are to remain the same for the same tenant or a new tenant; c) tenants who have satisfactorily fulfilled their contractual obligations in 1971-72 have the right to continue working the rented lands; and d) tenant rights will be passed to immediate family members in the event of the tenant's death, absence or incapacitation.

A law of this nature will have a significant impact, but it only buys a little more time to solve the more fundamental problems. It has achieved its objective of stabilizing rentals this year for small tenant farmers and agricultural cooperatives; it has received widespread political support; and it has extended poorer tenant farmers a measure of tenure which assists them in qualifying for credit from financial institutions (see San Salvador [illegible] of April [illegible] 1972 for additional information re rent law).

4) Poor Credit and Product Markets

Limited access to agricultural credit and product markets [illegible] also common in rural El Salvador. Since most improved cultivation practices require off-the-farm inputs -- often including additional labor -- that must be financed until crops are sold, production credit must expand with technological advancements. Small producers need credit on a timely basis, at low rates of interest, with [illegible] repayment periods, and liberal collateral requirements in order to capitalize their operations and incorporate new technologies. Increased use of off-farm inputs also requires increased off-farm sales. Poor market services -- transportation, storage, processing, and price [illegible] depress commodity prices at harvest and [illegible] [illegible] realizing money incomes adequate to cover production costs [illegible] risks associated with adoption of new production practices. [illegible] associations to perform or contract market services are handicapped by the individualistic nature and broad dispersion of small producers.

While total financing to the agricultural sector has been increasing over the past several years, the small and medium producers still are not being reached in large numbers. In the period [illegible] an annual average of about [illegible] million of credit [illegible] was granted to agricultural producers of which [illegible] of the total went to coffee, cotton and sugar. This meant that the small and medium size producers of basic grains received less than [illegible] of [illegible] credit. (See Annex IV Exhibit [illegible].)

The funds provided for small and medium farm [illegible] producers and other small producers [illegible] [illegible] ABC, the supervised credit agency for El Salvador. [illegible] reaching several thousand small producers each year [illegible] 1970), a serious structural deficiency exists within the credit system. Theoretically, producers are supposed to use the supervised credit facilities for a short period of time (i.e., [illegible] years) [illegible]

then graduate to the commercial banking system. This is critical to a program of supervised credit because of the cost involved in supervision and the need to reach additional producers who need supervision. This has not been the case with ABC which, over time, has developed a small clientele of several thousand who return year after year for operating credit due to the unwillingness or inability of other institutions to provide service to these producers.

5) Administrative Problems of Public Institutions

Many of the public institutions, and particularly those in the Ministry have a series of other problems which reduce their effectiveness in assisting the development of the agricultural sector. Some of these such as low salaries, insufficient equipment, poor travel allowances and few vehicles have been elaborated before but are important in increasing the problem of holding good technicians. This magnifies the problem of a scarcity of trained personnel at all levels. An additional shortcoming is the lack of management systems for providing a good decision-making atmosphere through which these institutions can set priorities among the tasks assigned them. Too many decisions are made at the top for reasons of political expedience with inadequate consideration of technical factors. (A Benefit/Cost Analysis of Technical Assistance in El Salvador highlighted these deficiencies. For a summary of the analysis see Annex IV Exhibit K).

SECTION II: The GOES Agriculture Strategy

The GOES agriculture strategy is one component of a broader rural development program which includes in addition to increasing agricultural income, employment, and productivity, the improvement of the quality and accessability of educational and medical services in the rural areas. An educational reform program is being implemented in both urban and rural areas and will be in full operation in 1974. This program calls for about 425 new primary, secondary and technical schools and the use of educational television programs on nutrition, family planning, home economics, and agricultural extension. A projected 1.75 million people will be affected by this program when it is fully operational. A rural health program is being planned to provide new mechanisms for delivering primary health services through increased utilization of auxiliary nurses and health promoters within rural areas. Moreover, the Ministry of Health is now implementing a $1.5 million IDB loan for rural water systems.

A) Productivity Increases and Land and Labor Utilization

To tackle this critical problem area, the GOES is expanding research efforts with specific emphasis on applied research in production techniques, land use and product mix throughout the country and to improve and expand the extension service delivery of new technologies. The institution responsible for this will be CENTA. The Ministry of Agriculture plans to include a diversification program with emphasis on the production of fruit and vegetables and to more fully utilize existing and planned irrigation projects. This diversification effort will require effective applied research and extension programs by CENTA. The diversification effort coupled with the irrigation projects will provide the opportunity to utilize the land more intensively both during traditional seasons of low labor demand and in the production of labor-intensive crops will be stressed. It will also contribute to increasing incomes through emphasis on high valued products.

B) Marketing Reform

Efforts to improve the market system in El Salvador lag behind those efforts to increase production. The GOES through IRA plans to expand the grain purchase program as a stimulus to competition and price stability. The Ministry of Agriculture and the Ministry of Public Works are presently planning transportation improvements stressing access roads in rural areas. The Ministry of Agriculture's market information system needs to be improved; the Ministry of Agriculture is currently considering shifting this department to IRA and expanding the number of agents in the field. A $6.1 million IDB loan is financing wholesale and retail market construction in San Salvador and will reduce marketing margins to the benefit of both producers and consumers.

C) Land Tenure Reform

The Ministry of Agriculture plans to focus on programs for land redistribution and more intensive land use. This will be accomplished, in part, by proposed irrigation districts which involve redistribution of land within the project boundaries, which will allow land utilization by more producers on a year-found basis. The implementing agency will be the Directorate of Irrigation and Drainage (DGORD) with research on new land use methods, new crop possibilities and a new product mixes provided by CENTA. The other part of the plan involves land ownership redistribution by ICR. It will involve land purchase and resale in selected land reform zones. ICR will also coordinate with CENTA, ABC, and IRA for short and long term credit, improved input availabilities, market services and information in these zones.

D) Administrative Reform

A serious attempt at total reorganization has been underway for the last few years. The creation of CENTA is the first step. Reform legislation is in preparation for six autonomous public institutions operating in agriculture and plans have been prepared for a policy board to coordinate their participation in the agriculture sector (see Figure 1 for the new structure).

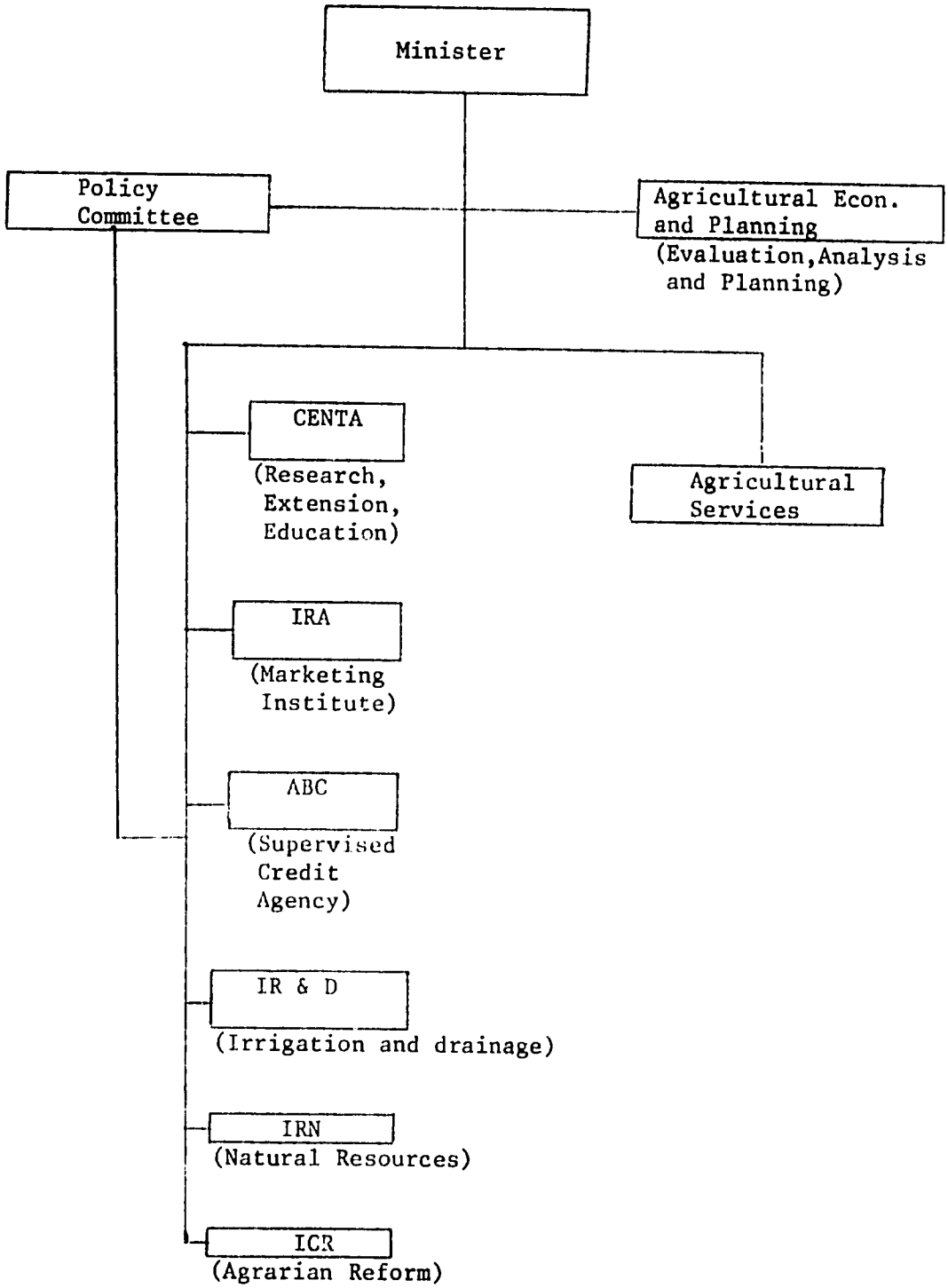
As presently planned, there will be a new MAG policy board consisting of the Minister of Agriculture and the heads of each of these agencies. Three of these agencies, the Center for Agricultural Technology (CENTA), the Marketing Institute (IRA), and the Supervised Credit Agency (ABC), are now semi-autonomous agencies under the Ministry of Agriculture. The Institute of Natural Resources (IRN) is under the Ministry of Natural Resources and will be moved to the Ministry of Agriculture. The Agrarian Reform Agency, Instituto de Colonización Rural (ICR) will be reorganized as semi-autonomous agency under the Ministry. A new Irrigation and Drainage Institute (IR&D) will be formed from Dirección General de Obras de Riego y Drenaje (DGORD) and will also become a semi-autonomous agency of the Ministry. Each of these agencies will have a policy board which will include private sector representatives in addition to government officials. The CENTA board will consist of the Minister of Agriculture, the Minister of Economy, a CONAPLAN (National Planning Council) representative, a member of the National University Faculty of Agriculture, a private sector member from agri-business and private sector member to represent agricultural associations.

SECTION III: USAID Agricultural Strategy

The employment, income, educational, and reform goals of the GOES for the small and medium agricultural producers are top priority in terms of USAID support to the agricultural sector. USAID support will:

1) Encourage and assist in a continuous analytical process to provide the basis for well-designed programs to meet well defined goals;

Figure No. 1 ORGANIZATION OF MINISTRY OF AGRICULTURE



2) Loan fund implementing such programs and support efforts of the GOES to secure funds from other sources; and

3) Grant fund needed technical assistance and training programs.

The strategy of USAID has been to create within the planning groups of the GOES a sector consciousness or awareness with respect to the design of programs and reform of institutions within agriculture for furthering the sector's development. This strategy appears to be paying off. While there is much to be done in the areas of planning and reform, GOES planners are now thinking in terms of a sector approach. The CENTA program represents an attempt to secure the basis for major reform through research, extension and education. AID also stresses the need for the Ministry to develop a small farm and farm worker constituency capable of articulating needs and supporting public agricultural development institutions and programs. The development of such a constituency can play a major role in encouraging reform programs. The USAID strategy also includes grant support to the GOES in improving management and decision-making capabilities. AID recognizes in its programs that a private sector contribution is also critical to the development of the sector since the presence of cooperatives, private credit institutions, farmer associations, small rural agro-industries, etc., strengthen the agriculture development process.

The USAID strategy has been carried out mainly through grant funding personnel and money to assist in analytical studies such as the Nathan study and the 10-week sector review. The strategy also includes increasing the number and quality of technical personnel within the GOES through training and programs that cultivate an awareness that the solution to agricultural problems must be approached within a total sector context. It is the intention of USAID to continue to promote analysis and planning in the development of future programs and institutions. This loan will demonstrate to the GOES the usefulness of their planning and reform efforts in achieving agriculture sector goals.

The continuing strategy of USAID is a multi-phase sector development program for El Salvador. The decision to adopt a phased loan program rather than develop total sector loan package was a result of two factors. First, the GOES planning and reform efforts have not reached a stage where a total sector package is feasible in terms of design and implementation. For example, in order to support a major land reform effort it will be necessary to have more agricultural

credit, markets and market services, and research, extension and education. However, the credit institutions which would logically provide the credit must be reorganized and more research and program development is necessary in the marketing area. In fact, only two programs were identified in the 10-week sector review as being ready for implementation. One of these is the CENTA program which is this loan proposal. The other was a regional grain storage program which was not included in this loan due to some legal and design constraints which required more time to solve than was available in this fiscal year.

The second factor is that the CENTA program is concerned with research, extension, and education which are traditionally the areas requiring the longest lead time to develop in a sector program. Since research, extension, and education are a critical part of the GOES strategy, it is logical to begin their development first to provide the base for other sector components. As a result of these considerations, this loan is proposed as the first phase of a multi-phase program. As the planning and analytical processes continue to provide new reforms and programs further USAID loan assistance can be utilized.

Finally, the continuing agricultural sector analysis efforts of the Ministry which will be promoted by this loan and grant funds will include studies of those other constraints considered critical to advancing Salvadoran agriculture. In the area of credit there are specific requirements for analysis of public and private lending institutions, their management capabilities, lending policies, and systems of a channelling short-term (operating) and long-term (capitalization) credits to the farmer (owner, renter and worker) beneficiaries of CENTA. In marketing in-depth analysis will focus on the operations of grain storage facilities, the management of price support programs, their coordination with regional grain marketing policies and the location of regional facilities for easy small-farmer access. Land distribution and tenure will be considered from the point-of-view of numbers of farmers that land reform measures will benefit by increasing their eligibility for and receptiveness to government technology, credit and marketing activities.

PART FOUR: ANALYSIS OF THE PROGRAM

I. Background - Research, Extension and Education

In 1942 the GOES, with the assistance of the U.S. Department of Agriculture, established within the Ministry of Agriculture a department for agricultural research, the Dirección General de Investigaciones Agrónomicas. The department was charged with the responsibility of initiating research in El Salvador's principal crops, coordinating its efforts with research conducted elsewhere in the world and providing the extension service necessary to transmit research findings to the field. However, the department's scope was limited as only four research units were created consisting of agronomy, plant pathology, horticulture and agricultural engineering. Consequently, the emphasis of the work undertaken during the 1940's was on coffee, corn, rice and other cereals. To expand the field extension work, the GOES created a separate division for the Extension Service in 1949 within the Ministry of Agriculture. The Service, consisting of 35 field offices with 50 agents, concentrated its work principally in corn and other cereals as there was an intensified effort on behalf of the research department, assisted by the USDA, to develop and promote hybrid seed corn. All research work pertaining to coffee was separated from the department in 1955 with the formation of the coffee institute (Instituto Salvadoreño de Investigaciones de Café) a public entity supported largely by federal government tax receipts on exports of coffee. Approximately 30% of the GOES resources for agriculture research continue to be devoted to coffee research.

In 1959 the research department was expanded by the addition of 3 divisions in chemistry, soils, and entomology with a corresponding increase in personnel. Field extension offices were increased during the period 1960-65 to a total of 50, composed of 70 field agents and 30 home economists. In addition, the extension service enlarged its scope of work to include training and assistance in a variety of crops (emphasis on beans, rice, forage, corn), organization of 4-H groups (total in 1971: 269 groups, 5,500 members) and field demonstrations (average of between 4500-5000 per year). In 1968, the research department and the extension service were once again merged under the Dirección General de Investigación y Extensión Agrícola. The present composition of the research department is explained more fully

below; the extension service presently has 69 field offices of 169 agents and 52 home economists.

The National Agricultural School (ENA) established in 1956 provides a 3-year junior college level program of course and field work. The National University and U.S. universities grant 2 year university credit for the completed 3 year program towards a B.S. degree. The ENA with some assistance from the IBRD education loan has expanded its training facilities and the teaching staff has been expanded to the present level of 42 full-time professors and instructors. Present enrollment is 250 students (graduating class of 60 a year).

II. Executing Agency - CENTA

A. Development of the Institution

1) Planning CENTA

In June 1968 the MAG undertook a review of the agricultural sector to update the five year plan (1968-72) for the period and to address the problem of the stagnation in the growth of the agricultural sector as a whole which El Salvador had experienced from 1964 to 1968. The principal conclusion of the review was that agricultural output had declined due to an accumulation of specific crop and livestock problems (mostly diseases and insects) that had come with attempts to diversify and intensify farming and for which there were no answers available in El Salvador due to inadequate technical research and education.

To continue the analysis undertaken during this report, the Minister of Agriculture appointed a high level committee in October of 1968 which would coordinate their work with AID technical advisors. The conclusion reached was that El Salvador did lack a capacity for applied research and, in addition, a system to transfer such technology to the field by means of a direct linkage between research and agricultural eduction and extension. The conclusions were embodied in a report for the Rockefeller visit in May 1969 and a description of the institution was elaborated, as well as, a proposal for an eight-fold increase in the budgets of research and extension.

The Ministry of Agriculture delineated the proposal further by appointing a special commission, again with USAID/ USDA participation, to define the organizational framework necessary for such an institution, as well as, the capital and technical assistance necessary to expand agricultural technology, education and extension. The report (CENTA Report) was completed in July 1970 and recommended that the Ministry create an integrated institution under one Director General which would encompass research, education (ENA) and extension and that the institution (CENTA) be a semi-autonomous agency within the Ministry. The report also outlined the ideal composition of the agency at the end of an extensive development program: specifically, a 12 year research development program to establish 115 research units each staffed by a unit head (Phd. level), an associate (M.S. level), an assistant (B.A.), an apprentice, a helper and a bilingual secretary; a 7 year extension development program to staff each of 125 field offices with a director, four agents and one home economist; and a five year program to expand the ENA from 250 students to 650, as well as, to undertake the training abroad of 35 MA students beginning the second year and expanding to 95 MA students by the seventh year (30 per year thereafter) and 14 Phd students beginning the fourth year and expanding to 55 students the ninth year (15 per year thereafter.) The report also outlined the foreign technical assistance needs, the research and school facilities, necessary salary levels, and the organization of the institution. The total international financing required over the 12-year program was estimated at US$40.0 million which would complement a similar amount from GOES budgetary resources.

The Ministry appraised the report and was of the opinion, also shared by the USAID, that it was too ambitious and that what had to be done was to establish realistic priorities and goals, and, secondly, direct attention to the design of the institution to insure the maximum integration of the individual functions of research, education and extension which must develop and efficiently transfer technology to the field.

2) Development of the CENTA PERT

To assist the Ministry design the structure of the institution which would effectively integrate the three functions and prepare a plan for the orderly development of CENTA, the Mission contracted a PERT specialist in June 1971 to work with the Ministry to elaborate a detailed PERT for CENTA. The

Ministry assigned the departmental heads of planning, research and education to prepare the PERT in coordination with the contract advisor. The initial work in July 1971 concentrated on the development of the PERT framework and from that time to April 1972 the department heads, with periodic assistance from the contractor, developed the final PERT plan. The final presentation was made to the Minister of Agriculture on April 22, 1972.

As the PERT exercise was the work of the men who would eventually be the heads of CENTA, the major substantive modifications required in past CENTA plans as a result of the PERT were readily endorsed by the Minister of Agriculture. The PERT was invaluable in establishing the necessity of the MAG to focus on research and education priorities by crops and departments so as to utilize the limited human and financial resources of the institution. It defined the inter-relationship of training to proposed work priorities in research and education and indicated lead times necessary for development of human resources. Also, it pointed out the extremely high administration costs and poor manpower utilization in past CENTA plans (PhD's in largely administrative positions) and defined a framework for CENTA which centralized administration responsibilities and coordinated research, education and extension work through a limited number of departments in which all services participated. The modifications of the CENTA organization proposed as a result of the work have been incorporated in the CENTA plans and as a part of this loan proposal.

The completed PERT is an important management tool, both for the Ministry of Agriculture and the USAID, as it provides a plan for the timing of all the numerous components which must be incorporated into the project for the successful development of the institution. A brief summary diagram of the PERT chart is included in Annex III , Exhibit A

B. Organization and Staff

CENTA was created as a semi-autonomous agency of the Ministry of Agriculture in December 1971. It has autonomy in scientific, technological and administrative affairs and obtains funding through the normal budgeting process of the Ministry of Agriculture.

Unifying the separate units of the national agricultural school (ENA), the research department, and extension division, the CENTA reorganization has centralized many service and administrative functions. Operating responsibility is vested in the Director General who is appointed by the Minister of Agriculture. The administration staff tied directly to the Director General include: the Administrative Office, the Secretariat, the Office of Coordination of Foreign Advisors, the Information and Editorial Office, the Audit Office and the Agricultural Research and Education Library. All administration and support offices are directly responsible to the Office of the Director General.

Overall control of CENTA policies and activities will be vested in a Policy Committee and an Advisory Council (see Organization Chart). The Policy Committee, directly under the Minister of Agriculture, is comprised of the Directors of IRA and ABC. The six members of the Advisory Council will be:

1) a representative of the agricultural cooperatives;
2) a representative of the agricultural associations;
3) a representative from agribusiness;
4) the Minister of Economy or his representative;
5) a representative of National Planning Council (CONAPLAN);
6) a representative of the University of El Salvador.

The Council members will be nominated by their respective institutions or agencies and appointments will be made by the Minister of Agriculture. By law the Advisory Council must meet twice a month. The establishment of the CENTA Advisory Council will be a condition precedent to initial disbursement under the loan.

The Advisory Council will have two primary responsibilities: first, to establish program priorities for each of the three principal divisions of CENTA (Research, Education and Extension), to review program implementation plans, and to evaluate on-going activities; secondly, to review actual expenditures and to approve annual budget levels.

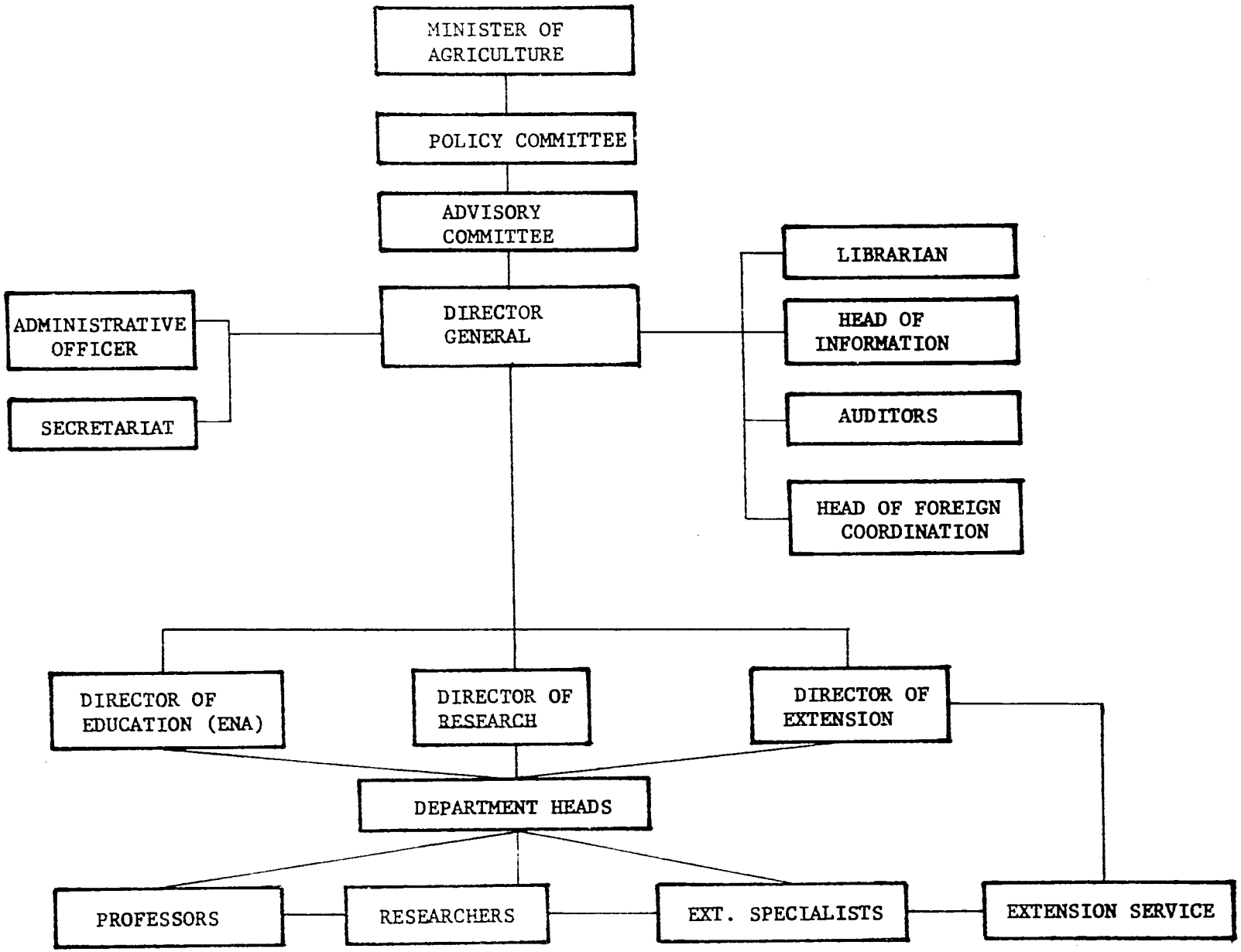
The three directors of the Education, Research and Extension Divisions will continue to be responsible, under the Director General, for all operational activities. The directors of each division and their staff will work directly with the eight subject matter departments beneath them. The eight departments

are: Agronomy, Soils, Animal Sciences, Agricultural Engineering, Agricultural Economics, Agricultural Chemistry, Parasitology, and Agricultural Education and Social Sciences. Each department will have research, education and extension activities and include personnel from each division. Since all three divisions contribute staff and budget to the departments, exchange and collaboration of staff members permits research professionals to teach and participate in extension work, and should encourage the teaching and extension specialists staff to participate in research. The extension service will be represented in the departments by an extension specialist whose job it will be to help coordinate extension and research activities. CENTA has appointed five extension specialists and intends to build into the departments a total of 15 specialists. The five specialists appointed are: basic crops, vegetable production, beef cattle, dairy cattle and rural youth. To be named are specialists in the fields of food legumes, fruit production, swine production, poultry and small animals, soil conservation, agricultural economics and home economics.

The technical departments are responsible for the execution of research programs, teaching assignments and coordination with the field extension workers through the extension specialists. Each of the eight departments will be headed by a Department Head whose principal function is the coordination of all work undertaken within his department. Specific research work is organized around multidepartmental "programs" which are divided into various "projects" and "sub-projects" which clearly defines the responsibilities of research workers in each department.

CENTA ORGANIZATIONAL CHART

(See next page)


MINISTER OF AGRICULTURE
POLICY COMMITTEE
ADVISORY COMMITTEE
DIRECTOR GENERAL
ADMINISTRATIVE OFFICER
SECRETARIAT
LIBRARIAN
HEAD OF INFORMATION
AUDITORS
HEAD OF FOREIGN COORDINATION
DIRECTOR OF EDUCATION (ENA)
DIRECTOR OF RESEARCH
DIRECTOR OF EXTENSION
DEPARTMENT HEADS
PROFESSORS
RESEARCHERS
EXT. SPECIALISTS
EXTENSION SERVICE

In general, the personnel standards found at the management level within CENTA appear to be high (see biographic data in Annex III Exhibit). All but one of the top management staff (director general, directors of divisions and department heads - 12 in all) have a minimum of a B.S. degree (1 Ph.d) and each has extensive practical experience in their field of expertise. OSTA/USDA and AID contract personnel have been working more than 25 years with the agricultural departments which have been incorporated into CENTA and for the last year with the new CENTA organization. The Mission has determined during intensive review that CENTA has the managerial and technical abilities to implement the proposed loan project.

C. CENTA Objectives

CENTA has the responsibility of carrying out the objectives of the GOES as those objectives relate to agricultural research, education and extension. The GOES stated objectives are to increase employment, bring about more equitable income distribution and to increase agricultural production. Therefore, the first objective of CENTA is to identify through research the more labor intensive crops that are economically feasible for production in El Salvador, to identify the production constraints that hinder their introduction and to develop a technological package that can be transferred to the producer. The second objective has to be solved concurrently or prior to this introduction. Stated simply this is to increase or maintain production of the present basic crops now grown in order to make land available for the introduction of more labor intensive agricultural activities. The third objective is to reorganize and provide an updated curriculum that is responsive to the country's needs in terms of the goals established by the GOES. The fourth objective is to utilize the trained manpower within the transfer process of technological innovation. The fifth objective which is fundamental to all the other is to provide to the highest degree possible the technical competence of their staff. (See Annex IV , Exhibit A for technical planning for next four years). The final objective is to disseminate the information about new production possibilities to the rural producers of El Salvador with the guiding principle of achieving increased agricultural productivity, more equitable income distribution and greater rural employment.

D. Limitations

There are several acute problems at the present time confronting the successful development of CENTA in order that it may become a dynamic organization capable of solving the stated problems confronting agricultural development. The most obvious problem and one that will be solved by the proposed AID loan to the GOES for CENTA is the inadequate research and education facilities and the present physical separation of research and extension at Santa Tecla and the location of the school at San Andrés 20 kilometers away. This physical separation has to be solved before the three pieces of the agricultural development team will fit together and work as a single unit. There is also a need to expand and improve CENTA's regional research stations and to develop regional agricultural centers to coordinate the technological transfer program.

The second limitation is the lack of adequately trained people. This is specially true with the extension program - the technological transfer inovators who must carry the results of training and research to the agricultural producer of the country. The transfer of knowledge is perhaps one of the most difficult problems of the agricultural development process. The program in El Salvador may be better than some but the fact remains the only person in the entire extension program with the equivalent of a Bachelors of Science degree is the Assistant Director of Extension. It is impossible to build an organization with technicians who have only junior college level training. Without adequately trained people the development process becomes stagnated. The results that can be expected, to a large degree, depend upon the human resource capability that is available which in turn is largely dependant upon the level of training of the individual involved.

These critical problems as they relate to the integration and development of the functions of research, education and extension are analyzed in the sections below.

E. Financial Analysis

1) Previous CENTA Financing

During the past three years, the divisions and departments which have been incorporated into CENTA have consistently accounted for over one-quarter of the Ministry of Agriculture's total annual expenditures. (See Annex III Exhibits D and E). In 1969 the departments accounted for 30% of total Ministry expenditures; in 1970, 28%; and in 1971, 30%. For 1972, the CENTA budget represents 32% of the entire Ministry budget.

Table 1 below summarizes the actual expenditures (1969-71) of the agricultural divisions and departments which were incorporated into CENTA and the 1972 budget for CENTA.

Table 1: Expenditures-Research, Education and Extension 1969-71
(In thousands ¢)

Year	Total Annual Budget	Administration, Operation and Salary Costs	Investment GOES	Investment Other
1969	¢ 3,809	¢ 3,285	524	
1970	4,090	3,422	668	
1971	5,284	4,004	680	600 (IBRD)
1972 (budget)	6,173	4,824	892	457 (IBRD)
TOTAL	¢ 19,356	¢15,535	¢ 2,764	¢ 1,057
(in US$ thousands)	($ 7,740)	($6,215)	($1,100)	(US $425)

A part of the increase in CENTA's 1972 budget is a reflection of inclusion of the Ministry's livestock research and extension units into CENTA at the beginning of 1972. These programs include: the Livestock Promotion Program (MEGA) with 16 field agents and researchers; the Swine Promotion Program (MEPO) with 10 field agents and researches; and the Animal Sanitation Department of the Ministry with 7 field inspectors and research coordinators.

With the continued incorporation of various semi-autonomous institutions into the Ministry of Agriculture (Natural Resources Department, Drainage and Irrigation Division, etc.) as a part of the reorganization of the ministry explained above, all present extension workers and researchers within these departments, plus their budgetary allotments, are to be transferred to CENTA.

During the latter part of 1972 the following units and special programs are being moved into CENTA.

Program	No. of Field Agents and Researchers	Budget Transfer (Including Salaries and Operations in ¢)
1) Cotton Program (MAG)	12	¢ 625,000
2) Bean Program (MAG)	8	
3) Diversification Program (FAO coordinated)	9	¢ 300,000
4 Natural Resources Programs (from Ministry of Interior)		
a) Fisheries Program	5	¢ 225,000
b) Soil conservation	6	¢ 100,000
5) Irrigation and Drainage	11	¢ 150,000
TOTAL	51	¢1,400,000 (US$560,000)

The transfer of these units to CENTA represent a significant portion of future increases in the projected CENTA budgets during the period 1973-76.

2) Projected CENTA Budgets 1973-76

The budget projections for CENTA during the implementation phase of the loan project were developed by the Ministry of Agriculture and the USAID on the basis of: the CENTA's present personnel; the expansion of personnel (research, education, and extension) detailed in Part 4, Sections III - V below; the increased salary projections specified in the same sections; the estimated administration and operational costs for the expanded institution; and the investment costs of the loan program and non-related investment costs ("Other Costs"). The projected budgets do not include technical assistance and training to be included under the loan totaling US $320,000.

Table 2: PROJECTED CENTA ANNUAL BUDGETS
1973-76 (in 000's colones)

Year	Total Budget	Admin. & Operating Costs	Salaries	Other Costs	Investment Program GOES	Investment Program A.I.D.
1973	9,360	2,520	3,950	210	900	1,780
1974	15,170	3,015	4,755	600	2,200	4,600
1975	13,700	3,590	5,710	300	1,300	2,800
1976	11,100	4,150	6,650	300		
Total	¢49,330	¢13,275	¢21,065	¢ 1,410	¢4,400	¢ 9,180
US $ equiv. (000 's)	$19,725	$ 5,310	$ 8,420	$ 560	$1,760	$ 3,675
% of total	100%	27%	43%	3%	9%	18%

The financial plan sets forth the total counterpart requirements of the GOES during the implementation of the loan assisted program. The plan has been reviewed and approved by the Ministry of Finance and the National Planning Council, which is responsible for all GOES investment budgeting. The approved plan is incorporated in the GOES letter of request for the loan from the Ministers of Agriculture, Finance and the National Planning Council. (See Annex I , Exhibit B).

As shown in the table 3 below, the projected budget levels for CENTA during the implementation period of the loan represent a significant increase in funding for CENTA.

Table 3 (next page)

Table 3: COMPARISON OF CENTA BUDGETS
(in 000's Colones)

Year	Total Admin. & Operating Budget	Total Annual Increase	Annual % Increase	Total Investm't Budget (GOES, IBRD & AID)	Total Budget	Annual % Increase or Decrease
1969	3,285	--	--	524	3,809	--
1970	3,422	137.	5%	668	4,090	7.4%
1971	4,004	582	17%	1,280	5,284	29.1%
1972	4,824	820	20%	1,349	6,173	17%
1973	6,470	1,646	34%	2,890	9,360	51.6%
1974	7,770	1,300	20%	7,400	15,170	62.0%
1975	9,300	1,530	19%	4,400	13,700	Decrease
1976	10,800	1,500	16%	300	11,100	Decrease

The increased expenditures are due in large part to the planned expansion of CENTA staff, the Ministry program to standardize and increase salaries and the incorporation of separate agricultural research and extension services into CENTA mentioned above. With the inclusion of the five research and extension units and programs, the total projected base budget for CENTA operating and administrative costs in 1973 (including salaries) will be approximately ¢6,325,000. From that point on, the increased operating budgets reflect the internal build-up of staff, especially the extension and research services, and the salary increases. Table 4 below demonstrates the significance of the transfer of existing research and extension units into CENTA and the projected budget increase required to support the expanded CENTA program to 1977.

Table 4: Additional Administrative and Operating Costs of CENTA during Implementation Period of the Loan (in thousands Colones)

Year	Estimated Base Operating and Administrative Budget as of 1973 (incl. salaries)	Total Projected Administrative, Operating and salary costs - Table 1	Additional Administrative and Operating Costs for CENTA
1973	¢ 6,325.	¢6,470	¢ 145.
1974	¢ 6,325.	¢7,770.	¢1,445
1975	¢ 6,325.	¢9,300.	¢2,975.
1976	¢ 6,325.	¢10,800.	¢4,475.
TOTAL 1973-76			¢9,040.
(In US $ equivalent thousands)			$3,616.

In addition, the GOES will finance approximately US$ 1,748,500 of related investment expenditures for the project. This sum represents 50% of all construction and furnishing costs for the project and is included in the budget projections in Table 2. Total GOES counterpart requirements for additional administration and operational costs and investments costs for the project will be US $5,364,500.

III. THE DIRECCION DE INVESTIGACION (RESEARCH DIVISION)

A. Objectives

The objectives of the Direccion de Investigacion (Research Division) are: (1) to identify through introduction trials those labor intensive crops suitable for production under the ecological conditions of El Salvador; (2) to investigate improved varieties of the basic crops that may have greater production potential under Salvadoran conditions; (3) to select and multiply seeds of the recommended crop varieties; (4) to identify the constraints that are detrimental to increased production of all agricultural crops; (5) to develop technological packages that can be carried to the producer by the extension service; (6) to provide basic information about soils, seeds etc. as required; (7) to cooperate with the extension service and training division to provide the technological information that will allow greater employment, bring about more favorable income distribution and increase agricultural production.

B. Present Situation

1) Projects and Subprojects

The 131 research subprojects (experiments) carried out during 1972 have been organized under 38 projects (mainly identified by crops) and 9 programs designed mainly to solve by an interdepartmental approach, the problems limiting the productivity of a priority agricultural product.

The budgetary units providing staff, supplies, equipment, facilities and transportation are the four subject matter sections of the Dirección of Research: Food and Industrial Crops, Horticultural Crops, Soil Studies, and Plant Protection, and three service departments Certification and Seed and Plant Increase, Laboratories, and Experiment Stations.

The nine programs include the following: Cereals, Edible Legumes, Fruits, Vegetables, Oil Crops, Fibers, Sugar Cane and Forages, Weed Control and Soils. Each of these programs is under the surveillance of an interdepartmental committee which meets at least once a month to review progress and consider problems. The projects and subprojects covered by a program include breeding and agronomic work, insect, disease and nematode work, and soil fertility and water management work. The program committees are formed not only of CENTA research personnel but of representatives of extension and of other institutions in which pertinent work is going on. The on going subprojects or experiments undertaken are initially proposed by the Section Chairman to the Head of the Administrative Department of Research after

having been reviewed by the appropriate Program Committee. There is an annual review of each subproject until it reaches its termination.

2) Staff

The technical staff of the Dirección of Research in 1972 was contained in the four subject matter sections and three service departments mentioned above. Of the 60 technical staff members, 28 held the title of Ingeniero Agrónomo with five years of University training and the rest held Perito (Expert) Agrónomo diplomas with three years of post-high school training. In addition there are twelve chemists working in the Soils and Chemistry laboratories. This staff is inadequate in size and training to undertake more than a limited part of the research needed to solve the basic problems of Salvadoran agriculture.

3) Physical Resources

a) Central Facilities - In 1972 the central facilities of the CENTA Dirección de Investigación Agropecuaria are situated at Santa Tecla, 10 Kms. to the South of San Salvador and occupy a total of 4 Has. They include the administrative offices, an auditorium, the offices and laboratories of the technical personnel and a small seed laboratory. With the exception of two reasonably well equipped modern laboratory buildings, these facilities are inadequate in size and appointments for the staff and functions to which they are devoted. There is a small Seed Technology Laboratory in a separate building.

There are three small greenhouses. Two of these are in good condition, and are being equipped with evaporative coolers. Located also at Santa Tecla are the facilities of the Department of Agricultural Information of the Ministry of Agriculture, including a press and a photographic laboratory; a mechanical repair shop, a carpentry shop and a metal shop. None of these is adequate for the services required.

The Dirección maintains a biometrics office which is responsible for the statistical planning and analyses of the subprojects, and a small library for the technical staff. In both instances, they are inadequate for the services required.

b) Experiment Stations - CENTA has three experiment stations: San Andrés, Santa Cruz Porrillo and Izalco. The Experiment

Station of San Andrés, 30 kms. South of San Salvador, 233.8 Ha., is adjacent to the National School of Agriculture where the new central facilities of CENTA will be placed. At present approximately 60 Ha. of this land is used for crop improvement and agronomic research and the remainder is used for commercial production of seeds and plants. At present part of the area is irrigated with water from four wells. There are 20 kms. of irrigation and drainage canals. Located on the San Andrés Experiment Station is the seed processing plant of CENTA. This facility is in poor condition and plans have been drawn to renovate it, with the help of the International Seed Technology group from Mississippi State University. There are several seed storage and machinery buildings, in addition, at the location of the seed processing plant.

The experiment station at Santa Cruz Porrillo, kilometer 67 on the Coastal Highway to the East, has 89 Has. of land, of which 58 are devoted to crop improvement and agronomic research and 31 to commercial seed and plant production. Pump irrigation and adequate drainage are available to most of the area. The Experiment Station has a small central work center with offices, a storage room and a small mechanical shop.

The experiment station at Izalco, 64 Kms. South of San Salvador near Sonsonate is an 8 Ha. unit devoted entirely to experiments and observations with fruit trees and fruit plants. Part of the area may be irrigated. There is a house and a storage shed. In addition, small experimental fields are maintained cooperatively with other Government agencies in several other parts of the country.

Additional land is needed, and plans are underway to develop new experiment stations in key climatic zones of the country.

c) Laboratory and Office Equipment - The basic laboratory equipment differs in quantity and quality in the different laboratories. The soils, chemical and quality control laboratories are reasonably well equipped, for the work of the present staff. Some of the laboratory equipment will be moved to the new laboratories when these facilities are transferred for other Government uses. The sections of food and industrial crops and horticulture lack laboratories and therefore have little laboratory equipment. The seed certification laboratory is deficient in basic equipment. The laboratories of the Section of parasitology are lacking in many of the basic and specialized equipment items required for the fulfillment of responsibilities.

The offices of the technical sections are adequately equipped with typewriters for present staff, but there is a lack of desk calculators, filing and copying equipment.

d) Field Equipment - The basic field equipment - tractors and their implements, sprayers, water pumps, etc. - at the Central Experiment Station of San Andrés and the two regional stations at Santa Cruz Porrillo and Izalco are below minimal for efficient present operations. The seed processing equipment at San Andrés requires complete renovation in order to satisfy present needs.

e) Vehicles - There is a serious shortage of vehicles within the Dirección de Investigaciones. There are only 19 in active service. As a result there is a considerable loss of efficiency due to waiting for vehicle assignment.

4) Improvement Program

CENTA, during its initial year, is strengthening and accelerating its development by taking advantage of technical assistance from outside the country as a complement to the resources of El Salvador. The technical assistance takes the form of (1) advisors, (2) fellowships for foreign study and (3) material support for building and/or equipment.

a) Technical Assistance Advisors - At the present time the Dirección de Investigación is receiving technical assistance from USAID grant funds from two A.I.D. contracts: a USDA-PASA contract and a University of Florida contract. The former provides a long term advisor on research and several short term advisors on special subjects. The latter provides long term advisors to the Animal Science, Agronomy, Plant Protection and Agricultural Economics Departments in the Dirección de Investigacion and/or the National School and other short term advisors. In addition CENTA benefits (1) from advisory services of the AID/Oregon State University International Weed Control Program with Central American headquarters at Santa Tecla, (2) of an AID irrigation specialist under contract from Utah State University, (3) of an advisor on cotton production practices from Israel and (4) of pasture and dairy advisors (FAO) to the crop diversification group previously attached to the Salvadoran Coffee Research Institute (ISIC).

There are also important linkages with advisory services of international agricultural development programs having headquarters

in other countries. These include the following:

1. International Soil Testing Program (AID) with regional headquarters in Guatemala City, Guatemala.

2. International Center of Corn and Wheat Improvement (CIMMYT) - with headquarters in Chapingo, Mexico.

3. International Rice Research Institute (IRRI) with headquarters in Los Baños, Philippine Islands.

4. Cooperative Central American Program for the Improvement of Food Crops (PCCMACA) in Guatemala City, Guatemala.

5. Center for Research and Training, Inter-American Institute of Agricultural Sciences, Turrialba, Costa Rica.

6. International Center for Tropical Agriculture (CIAT), Palmira, Colombia.

b) Staff Training - CENTA and its precursor organizations have provided professional improvement for staff members through planned programs of fellowships for foreign study. Under the provisions of these fellowships, the staff members selected by the Ministry of Agriculture are given leaves of absence with pay for a specified period in order to undertake a specific program of study, with the understanding that they must return to the position in which they were working or one equivalent in responsibilities and salary, for a minimum of time twice that of the leave of absence. The fellowship costs are usually covered by an outside agency. Under these circumstances at present two Dirección de Investigación staff members are studying for the degree of Master of Science and several have undertaken short term special training assignments in foreign countries during the past year. Five staff members have studied in foreign institutions for a year or more.

In addition to foreign training, attendance at professional meetings and participation in short courses within El Salvador and in neighboring countries has been allowed for some staff members of the Dirección de Investigación. To the extent possible funds are made available for this purpose. In 1972, eight staff members have

participated in meetings outside the country.

c) Material Support - The material support from foreign technical assistance for buildings that has been available for CENTA thus far is limited to a loan from the IBRD for the construction of some of the needs of the National Agricultural School. For the Dirección de Investigación plans are in progress for an integration of its central facilities with those of the Dirección de Extensión and the National Agricultural School at San Andrés through the A.I.D. loan now being proposed.

Material support for additional equipment and library acquisition has been limited mostly to project support for those activities in which technical assistance professionals have been associated.

5) Publication

The publication of research results is accomplished through a technical and extension bulletin series, the MinAg journal Salvadoran Agriculture, and international or foreign technical journals. Although several new bulletins are published each year, there is much research information that remains in the files. Incentives for publication, in terms of recognition of publication as a measure of professional productivity, are lacking. Language barriers and lack of financial support limit the opportunities of the staff to publish in foreign journals. A manual of production practices for the important agricultural enterprises is planned, and will provide an important link with extension agents.

C. Needs as Related to the Priorities of the GOES

1) Priorities of the GOES for 1973-77

The new priorities of the GOES include the following agricultural product groupings: (1) Basic food grains: corn, sorghum, rice and beans; (2) Import substitution products: vegetables, fruits, oil crops, forages and beef production, forages and milk production, pork, poultry, fish and forestry; (3) Traditional export products: coffee, cotton, sugar and shrimp, and (4) possible new export products: herbs and spices, flowers and ornamentals, and eggs.

In the 12 irrigation districts that have been or will be developed by the GOES, special priority will be given to intensive land use (multiple cropping) with high priority to labor intensive products like vegetables, and intensive dairy production. To the extent economically justifiable, feedlot beef and swine and poultry production will be combined with other agricultural enterprises, maximizing the use of local agricultural by-products, such as coffee pulp, sugar cane residues and cottonseed meal for feed.

In the small and medium farm areas of the coast and the northern hills which are not irrigable, a zonified agriculture recognizing the climatic situations will be encouraged, with major dependence on basic food grains, and in those zones with unfavorable alternatives, pasture, forage and beef cattle production and some forestry. To the extent possible diversification and multiple cropping will be encouraged as a way of increasing the intensity and extending the season of land use.

2) Priorities of Investigation in CENTA during the period 1973-77

The factors limiting productivity of the priority agricultural products vary from product to product and include such matters as availability of inputs (seeds, fertilizer, etc.) credit, price incentives, marketing and storage infrastructure as well as technical understanding of the necessary production procedures. The Dirección de Investigación deals with the development and application of research results necessary to solve problems of production and marketing. The research will be aimed at discovering and overcoming the constraints that limit the production in these priority areas.

During the first five-year phase of the development of CENTA, priority will be given to the following interdepartmental agricultural product programs: horticulture (including fruits and vegetables); cereals (including corn, sorghum and rice); leguminous edible grains (principally beans and southern pea), herbs and spices, milk and beef (with accompanying work on pastures and forages). Priority will also be given to programs or projects in conservation of natural resources, soil mapping, soil fertility, agricultural product processing, small agricultural machinery, irrigation and marketing of agricultural products. In addition to these the present programs in oil crops, fiber crops and sugarcane will be continued and programs in flowers and ornamentals, forestry, fish culture, poultry, swine and

beekeeping will be initiated. Brief statements are presented below concerning the first 12 programs.

a) Horticulture

Vegetables: In 1970, the value of vegetable imports was ¢3,479,592 while exports only amounted to ¢662,499 with a deficit of ¢2,817,093. The deficit resulted mainly from the following imports:

Potato	¢1,[illegible],251
Cabbage	592,648
Onion	[illegible]
Carrot	[illegible]
Tomato	[illegible]
Cabbage	535,130

All of these crops can be grown in El Salvador, are labor intensive and provide important nutritional inputs in the diet. Goals for increase in productivity and production include the following:

Crop	Yield (Kg/Ha) 1977	Yield (Kg/Ha) 1981	Hectares Cultivated 1977	Hectares Cultivated 1981
Potato	9,000	11,000	800	920
Cabbage	9,500	10,900	600	700
Onion	9,000	9,500	760	800
Tomato	17,100	18,000	850	900
Melon	11,000	12,500	950	1,000

Until now, only limited varietal trials and pest control work has been possible. Applied research on varieties and disease resistant varieties (especially on potato and tomato) together with work on improved insect and disease control practices, better fertilization and water management and better harvesting will provide the basis for the increases in productivity. Increased hectares will result from the availability of new irrigated land. By these means El Salvador will become self-sufficient in vegetables.

Fruits: El Salvador imports large quantities of fresh fruit principally from Guatemala. The value of plantains and bananas alone imported in 1976 was ¢3,[illegible],000. The goal for production in 1977, in order to become self-sufficient will be [illegible] of plantains and 66,700 MT of bananas.

In the next five years, in order to maintain or reach self-sufficiency hectareage must be increased in the following amounts:

Plantain and banana	6,000 HA
Citrus	3,486
Mango	1,600
Avocado	2,100
Other fruit trees	1,100
Cashew (for export)	1,500

In addition, yields of fruit must be increased. Until now, research has been limited mainly to observations on variety introductions, and to studies of fruit fly control. The necessary increase in productivity will result largely from applied research on disease control, better control of fruit flies and other insects and nematodes (citrus, mango and avocado, especially). A new cashew nut industry will provide an export product, and will use infertile coastal land not adapted to annual crops.

b) Cereals

Corn, sorghum and rice continue to be the principal food grains of El Salvador. The production goals for the coming five years are given below.

METRIC TONS

	1973	1974	1975	1976	1977
Rice	49,500	53,300	57,300	63,200	65,200
Corn	279,000	289,000	308,000	320,000	331,000
Sorghum	103,000	106,500	110,075	113,000	116,000

These increases will provide for self-sufficiency in terms of the needs of the rising population and for availability of some corn and sorghum for uses in animal feeding.

The increases in production will result from increased productivity, the objective being to hold hectareage relativity constant. Until now the main research interest has been in the introduction and breeding of varieties adapted to the country. Future research focus contributing to the increased yields will be on improved varieties, adapting new germ plasm from external sources such as CIMMYT to local

climate and insect and disease resistance requirements, on intensification of land by better water management and fertilization, and on improved price and storage policies.

c) Edible Legumes

The common bean and other edible legumes provide the major protein sources for the common people of El Salvador. At present, there is a deficit in production. The goal of the GOES is to attain self-sufficiency in the shortest time possible. In terms of production over the next five years, the goal is as follows:

METRIC TONS

	1973	1974	1975	1976	1977
Beans	33,100	35,200	37,400	40,000	43,700
Southern Pea	200	800	1,500	2,500	4,000
Edible Soybean	---	50	400	800	1,200

As in the case of cereals, increased productivity through higher yields and more intensive land use will make it possible to obtain increased production with a minimum of increase in total hectares devoted to these crops. Until now, the limited research has concentrated on variety improvement, and insect and disease control. Future research focus will be on varietal improvement concentrating on insect disease and nematode resistance and control in cooperation with international programs such as PCCMCA, improved fertilization and water management, combinations with other food crops, and price and storage policies. Although the common bean (phaseolus) will be emphasized, the research will continue to give importance to the increased production of southern pea (Vigna sininsis) and work on edible soybean will be undertaken.

d) Herbs and Spices

The cultivation and processing of herbs and spices has not been exploited in El Salvador and can be an important source of income. In general, they are intensively cultivated crops which do not require large areas and are labor intensive.

A processing plant for chili (Capricum annum) is now in operation, which provides a basis for an export industry.

The research program will include chile, vanilla, pepper, curcuma and other promising spices and herbs; in the first stage, concentration will be on introducing new varieties and studying new ecological factors and economic feasibility.

The goals for this program are to satisfy the local market and to sell in foreign markets.

e) Milk and Beef (With accompanying work on pastures and forages)

The production goals for milk and beef during the coming five years are as follows:

	1973	1974	1975	1976	1977
Milk (liters	1,200,000	1,300,000	1,375,000	1,500,000	1,600,000
Beef (head)	180,000	192,000	204,000	210,000	224,000

The increase in production of milk projected recognizes the large amount of powdered milk imported, and the great importance of milk in the diet. Primary emphasis in the development and expansion of intensive dairy production will be in the new irrigation districts, according to the priorities of the GOES. The increase in production of beef will result primarily from improved livestock and pasture management in the unirrigated northern part of the country where the long dry season and the terrain limit alternative uses of the land. In addition, depending on economic feasibility, feedlot operations using local byproducts such as coffee pulp, rice hulls, cotton seed cake and sugar cane byproducts will contribute to the supply of beef.

At the present time CENTA has a forage and pasture program which deals with pasture and forage improvement, pasture management, for nutrition of dairy and beef cattle. This program will be enlarged to include additional work on pastures and forages. In addition the new program will involve the determination of performance of dairy and beef cattle under different management regimes, the improvement of performance of dairy and beef herds by introduction of better breeds and artificial insemination, animal sanitation practices, dairy plant management, and economic studies on marketing, price policies and management practices.

f) Conservation of Natural and Renewable Resources

The high population density of El Salvador and the low cultural level of the farmer, have been the cause of great damage to its forestry and water resources, and soil fertility. It is of urgent necessity to make investigations in this field, making an inventory of the resources and the creation of special forestation programs of areas not suitable for agriculture and livestock, conservation of species, rational management and exploitation of forests and substitution for native species of low commercial value.

The forests will contribute to the restoration of soils and fauna of the country, will greatly favor water retention, and will utilize land not suitable for agricultural production. At present, 90% of the lumber consumed in El Salvador is imported. As goals for reforestation, for the northern zone, it is planned to reforest 10,000 hectares in a period of 5 years. In the intermediate zone the planting of 20,000 hectares of forest will be carried out. An association of producers of lumber has been formed, and this project is under way. CENTA will be responsible for the research on soil and water conservation, and on the research on silvicultural methodology, in collaboration with the Dirección General of Natural Resources. A team approach to the problems involved will be provided by new professionals in the departments of Crop Science, Plant Protection, Agricultural Engineering and Agricultural Economics.

g) Soil Mapping

With the objective of having an inventory of the physical and chemical characteristics of the soils of the country, soil mapping was initiated and up to date 29 quadrants, have been published which cover an area of 1,308,518 hectares. The map was not completed and the work has been stopped because of lack of human resources and of equipment.

The soil map of the country is essential before detailed evaluation of the soils can be carried. This information is essential before already planned irrigation projects can be established. Any logical plan of agricultural development requires detailed knowledge of the soil conditions.

The expanded staff in the Department of Soils will provide for the field and office work to complete this program by 1977.

It is planned by that date to publish the 26 missing quadrants which cover an area of 998,838 hectares; plus about 5 quadrants for specific irrigation projects.

h) Soil Fertility

The basic objective of the Soil Fertility program is to maximize the economic returns to Salvadoran farmers through the use of fertilizers and other soil amendments, such as lime.

To attain this objective, several steps are needed. These involve not only research but training and extension as well. These steps are:

1. Research - (Correlation of analytical methods, fertilizer response, correlation studies, methods of changing attitudes toward fertilizer use and what economically important problems need soil fertility research inputs and where).

2. Analyses - Research samples, farmers soil and plant samples, statistical analyses of data).

3. Interpretation - (Meaning of numbers resulting from analyses, probability of responses to fertilizer application).

4. Recommendation - (Fertilizer needed to attain yield goals for crop or crops for which analysis and recommendation is requested; availability of fertilizers recommended; timing of application).

5. Follow-up and feed-back - (Did farmer use recommendation, what results; changes needed; problems encountered which need research and or extension attention).

The Salvadoran program in soil fertility is guided by this basic philosophy but several factors have made it impossible to mount an integrated program as yet. These restrictive problems are attrition of personnel, insufficient budgets and immobility.

Some limited work has been done on methods of analysis, greenhouse soil analyses correlation studies and some field soil fertility experiments involving basic grain crops, sesame, peanuts and melon. Limited checks on the results of the fertilizer recommendations based upon soil analyses show that Salvadoran farmers using the laboratories fertilizer recommendations receive 1.5 to 10 times the national average production and 2 to 25 times the production of farmers using no fertilizer, depending upon the crop being grown and the soil analyses results. Soil fertility is certainly one of the major factors limiting crop production, 75 percent of the farmers soil samples analyzed are deficient in phosphorous and some 40 percent need potassium applications to correct deficiencies. Nearly all samples contain insufficient nitrogen for commercial crop production. Much more work remains to be done on the most economical and timely use of major fertilizer nutrients (N, P and K) to attain desired yields for all crops grown in El Salvador. For example, very little work has been done on the interrelationships between the supposed best crop varieties and optimum fertilizer use in the most important agricultural zones of El Salvador.

No work other than greenhouse studies has been done on minor element deficiencies in Salvadoran soils though field observations suggest that zinc, boron, magnesium, and manganese deficiencies may be affecting crop production and quality in many areas of El Salvador.

Increasing pressure on the limited agricultural land available in El Salvador will only accentuate soil fertility problem in the future. Answers are needed to these problems if the combined research, training and extension program of the GOES is to have the desired impact on El Salvador's economy. To get these answers in a timely and economic fashion will require investments in personnel, equipment and facilities.

Work on these problems will be done in collaboration with the International Soil Fertility Project of North Carolina State University and A.I.D. (AID/LA-646).

i) Agricultural Industries

Agricultural Product Manufacture and Processing: El Salvador has favorable characteristics for industrialization such as abundant labor, good communications, good geographic position, which have contributed to the early development of an industry based

principally on imported raw material, but which does not meet the needs of the country in this field. These needs have to be fulfilled with industries which transform the raw material that comes from local agriculture. This program is to investigate the manufacture and processing of agricultural products.

Agriculture provides seasonal occupation to rural labor as pointed out earlier and in some periods of the year underemployment in the field is alarming. It is for this reason that it is important to investigate those crops which employ underutilized labor, such as small manufactures of agricultural products and sub-products in which family groups can participate.

The home economics personnel will help promote the fields of home industries and artesania. The products thus elaborated can be marketed through cooperatives, fairs, displays and can be exported through INSAFI (Instituto Salvadoreño de Fomento Industrial).

Goals for this project will be improved manufacturing of shopping baskets, hats, bags, furniture, and processing of fruit and vegetables. In all those products, local raw material will be used. Other projects will be undertaken with oil seed extraction and fiber processing. The processing of cashew nuts will be a specific project which will be initiated, in anticipation of a production of 290 tons of processed nuts, from new plantations by 1977. Another agricultural industry project is to produce dry chili in powder and in tablets. This product will be for foreign markets. The goal is the processing of 270 MT of chili in tablets and 30 MT of powder per year with a value of ¢560,373.00 per year, or ¢2,801,865.00 in five years.

j) Minor Agricultural Machinery

This program will be limited to the testing, adaptation and manufacture of small machines and hand implements designed to make the work of the small and medium Salvadoran farmer more efficient. The object is not to displace labor, but to provide for a greater productivity of land and intensity of land use through tools and machines needed at periods of peak labor demand.

Initially a study will be made of the specific needs and opportunities for improvement of efficiency, with help from such international institutions as CIAT and IRRI. The benefits to be obtained will be estimated by agricultural economists in terms of improved land

productivity as well as cost and labor efficiency. Studies will be made of existing small machinery for farm operations such as land preparation, cultivation insect and disease control harvesting and drying. Where adaptation to local conditions is necessary, this will be done, and the feasibility of local manufacture will be studied.

This work will involve collaboration by the Departments of Crop Science, Animal Sciences and Agricultural Economics with the Department of Agricultural Engineering.

k) Irrigation

The GOES has committed itself to the long range development of 12 irrigation districts which will provide opportunities for intensification of small and medium sized agricultural operations. Four of these have already been identified. This program is intended to provide research information on the most effective use of the newly acquired irrigation water in these districts. There will be full collaboration with the office of Irrigation and Drainage Projects of the Ministry of Agriculture which is in charge of the engineering and development aspects of the new districts.

The research will be concerned with the problems of water distribution and use, from the engineering, agronomic and economic points of view. The various systems of irrigation most suitable for different crops, the crop combinations which provide most effective land use, and the irrigation - crop systems that provide the best economic returns will be studied. The work will involve collaboration of the Departments of Agricultural Engineering, Crop Science, Animal Science and Agricultural Economics.

l) eting of Agricultural Products

Fluctuations of supply and price of basic agricultural commodities, both seasonal and from year to year, have been a matter of concern to the GOES. The purpose of this program is to provide research on marketing which will deal with the economic problems involved. The research, carried on by the Department of Agriculture Economics of CENTA, will be in collaboration with IRA, the Department of Agricultural Economics and the Planning Department of the Ministry of Agriculture. It will contribute to the different agricultural product programs of CENTA in so far as the research is specific to them.

Studies to be undertaken will concern themselves with the influence of price structure and local and international markets on production of the key agricultural products of El Salvador, and on the income of the rural population. At the micro-level, work will be undertaken to determine the marketing constraints of individual crops with the idea that this will lead to the solution of the limiting problems.

D. Limitations Existing in 1972

In its first year of existence, 1972, CENTA is handicapped by the following limitations:

1) Dispersion of Central Facilities. The Dirección de Investigación has its headquarters at Santa Tecla, 20 km. from the main experiment station in a congested location separated from the teaching facilities, and not susceptible to expansion.

2) Inadequate Number and Training of Staff. The Dirección de Investigación has insufficient staff to provide for the research activities that should be undertaken. The level of technical training is not sufficiently high to provide for the research program needed. Budget for professional staff is inadequate in terms of staff positions and salary levels. The training program has been too small.

3) Inadequate physical facilities and equipment. The present physical plant is inadequate to provide for adequate administration and conduct of the research activities that should be undertaken. New buildings and greenhouses, equipped for modern research, and new field equipment are required to provide adequately for efficient research activity. The provision of land for research purposes is inadequate in area and in representation of the climatic zones.

4) Transportation. The number of vehicles and their condition is inadequate for the needs of the Dirección. Additional units, and an improved maintenance program are required.

5) Publication. The publication program of the Dirección of Investigación is inadequate for both the publication of technical results, and for the interpretation of these results for use by the extension service.

E. New Departmental Organization in the Period 1973-77

The interdepartmental agricultural product programs will be staffed and implemented by the eight consolidated subject matter departments, which will replace the sections and departments existing in 1972 and will serve the combined work of the Direcciones of Research, Teaching and Extension. These departments will be Crop Science, Animal Science, Agricultural Chemistry, Plant Protection, Soils, Agricultural Economics, Agricultural Engineering and Agricultural Education and Social Science.

The Department of Crop Science will provide the staff and facilities for plant breeding and agronomic research in the crop programs. In addition, the Department will carry on special programs in weed control and conservation of natural resources.

The Department of Animal Science will carry on the production and animal nutritional research in the animal programs. In addition it will provide research activity on dairy records and management and animal diseases.

The Department of Agricultural Chemistry will provide service analytical work concerned with the research programs in other departments. This will involve bromatological analysis to determine nutrient, fat, carbohydrate, fiber and protein content. It will also be in charge of the quality control laboratory to analyze feeds, fertilizers, spray and weed control chemicals, and to determine toxic residues.

The Department of Plant Protection will provide services in insect, disease and nematode control for the research program in the Crop and Animal Sciences. It will also maintain insect, nematode and disease collections and surveys and carry on the research program for beekeeping.

The Department of Soils will carry on the work in Soil Mapping and in Soil Fertility, contributing to the programs in Plant and Animal Science.

The Department of Agricultural Economics will develop research in agricultural marketing, concentrating on the research programs in the crop and animal sciences. It will also initiate training of professionals for investigations in farm management.

The Department of Agricultural Engineering will develop research in irrigation and water management in connection with the crop and animal science programs. It will also initiate research programs on agricultural product processing and small agricultural machinery related to the problems of the crop and animal science programs.

During the first five years the Department of Agricultural Education and Social Science will mainly confine its activities to teaching and extension, but will initiate some research, especially in the area of nutrition.

In addition to the buildings devoted to research, the administration, library and information buildings are to house service departments essential to the productivity of the research staff.

F. Needs for the Development of the Dirección of Research

1) Personnel

Numbers. In order to provide for the expanded research work in the eight consolidated departments, expansion of professional staff will be necessary. Starting in 1972 the projected increase in numbers during the next five years is as follows:

	Research Professionals	Research Assistants	Total	Increase
1972	40	31	71	--
1973	64	49	113	42
1974	77	55	132	19
1975	94	65	159	27
1976	101	68	169	10
1977	110	73	183	14

The distribution by department is indicated in Annex III Exhibit E.

In the case of the departments of Animal Science and Agricultural Economics it is to be expected that some staff members from other parts of the MinAg will be transferred to CENTA to work in research. These include personnel from the DG of Natural Resources in forestry and fisheries and DG of Livestock principally in dairy and meat production. Although these staff members will have primary

responsibility for research, they will devote some time to teaching, and will interact with the extension specialists in the departments. The staff members of the Dirección of Teaching at San Andrés will participate in research in the different integrated departments of CENTA, in accordance with their specialized training. This will recognize the advanced training of the teaching staff.

2) Salaries

The total annual budget for technical personnel is expected to rise during the five-year period as follows:

Total Cost for Salaries of Technical Personnel

		Annual Increase
1972	¢ 850,740	
1973	1,186,800	336,060
1974	1,412,460	225,660
1975	1,770,660	358,200
1976	1,968,372	197,712
1977	2,224,248	225,876

The increased cost of professional salaries from ¢875,000 to 2,244,000 in five years will result from annual increases in staff members, and from a 5% annual increment in individual salaries to alleviate the problems of loss of staff to other institutions. Details of the proposed salary scale for the different categories of technical staff are given in Annex III Exhibit F .

3) Training

In-country training of prospective or present technical staff members will take place at two levels. The Dirección of Teaching at San Andres (formerly ENA) will be expected to train the 42 research assistants required for the expanded research staff. Most of the new assistance will have the three years of training offered at present, but a few will receive the fourth year contemplated in the CENTA plan. The majority of the 70 additional research professionals will have their Ingeniero Agronomo title from the University of El Salvador where at the present enrollment, and the expected rate of graduation, the supply of new Ingenieros Agronomos will equal or exceed the needs of CENTA. As mechanisms for training, the research programs of CENTA are a source

of experience for students in the Dirección of Teaching and of thesis research for fifth year students in the University.

Training of present or prospective staff members in foreign institutions will take place at two levels. Selected department members will be sent out on fellowships for advanced study in foreign institutions (with preference to appropriate Latin American research and training programs) for intensive training of from several months to a year in the subject to be undertaken. A small group who have demonstrated unusual promise will be sent on fellowships to the United States or Latin American countries for graduate study on their specialty at the Master of Science level. During the next five years, the present plan for the Dirección of Research projects approximately 50 man-years of fellowship support from foreign sources. This would provide for approximately 16 man-years in 1973, 10 in the following three years (1974, 75 and 76) and 3 in 1977. Present projections are for the training of about 10 to the Master of Science level and about 61 for shorter periods in the next five years. The fellowships will be assigned to individuals in pertinent programs of the following departments:

Department	1973-77 foreign study fellowships
Crop Science	21
Animal Science	16
Agricultural Chemistry	5
Plant Protection	9
Soils	4
Agricultural Economics	3
Agricultural Engineering	13
Total	71

It may be expected from past experience that approximately 30 of the 50 man-years may be covered from AID-grant funds and the rest by the other international and bi-lateral sources.

Annex III Exhibit G provides the details by year..

4) Physical Needs

Buildings. In addition to the necessary provisions for

for services in the [illegible]
enance buildings, the [illegible] Research requires
phase at San Andres[illegible] for the
Soils and Agricultural [illegible]
and Agricultural Engineering, as well as
structures for [illegible]
these structures [illegible]

In the [illegible]
the staff and [illegible]
Plant Protection, [illegible]
35 research [illegible]
five technical [illegible]
addition to general [illegible]
and Entomology, [illegible]
including a seed [illegible]
facilities for the [illegible]
fer room for plant pathology [illegible]
and a preparation room for [illegible]
meeting rooms are required.

A Soils and agricultural [illegible]
for the departments of Soils and [illegible]
Department there needs to be [illegible]
and five research [illegible]
two technical [illegible]
are required for the [illegible]
a room needs to be [illegible]
adequate storage rooms and a preparation room.
Chemistry department needs to provide [illegible]
als and 10 research [illegible]
secretarial staff. Two principal [illegible]
routine bromatological work and one [illegible]
of these needs several special [illegible]
There need to be adequate storage and [illegible]

In the Animal Science building provision needs to be made for 17 research professionals, nine research assistants, about six extension specialists and two technical assistance extension workers, together with the required secretarial staff. The building will include laboratories for research on nutrition, meat and dairy processing and quality control, and for bacteriology and animal health.

There should be at least one meeting room. In addition, there will be stables and facilities for cattle, swine and poultry.

The Agricultural Engineering building must provide office space for eight research professionals, seven research assistants and two technical assistance advisors together with required service and secretarial staff. Laboratory and shop facilities will include machine and carpentry shops, a hydrology laboratory, and an agricultural products processing laboratory. There need to be ample storage rooms and equipment sheds in association with the buildings.

A Social Science building will provide for the departments of Agricultural Economics and Agricultural Education and Social Science. The Agricultural Economics department needs office space for four research professionals and three research assistants in addition to two technical assistance advisors and the necessary secretarial staff. A calculating room, and a filing room are needed in addition to the office facilities. Facilities must also be provided for the Department of Agricultural Education and Social Science, with office space for seven research professionals and four research assistance and associated service staff.

Two of the four greenhouses will be assigned to the Department of Plant Protection, for use in research on insects, diseases and nematodes. An insectory will be associated with one of these greenhouses. The other two will be assigned to the Department of Crop Science for work on breeding and special problems that pertain to the programs of highest priority.

Aside from standard office equipment and basic laboratory installations, which will be figured as percentages of the building costs, the laboratory and field equipment needs are listed by department.

The equipment listed is a complement to that already in use, which will be transferred to the new facilities when they are ready.

5) Vehicles

For the efficient operation of the Dirección of Research during the coming five years, a total of [redacted] vehicles should be purchased. These will include one vehicle assigned to the main experiment station, two trucks, two buses and two microbuses.

IV. THE AGRICULTURAL EXTENSION SERVICE OF CENTA

A. Objective

The Agricultural Extension Service is the primary vehicle for taking technological changes to the rural population of the country. The basic objective therefore is to carry the results of the research worker to the user -- the agricultural producer -- with the fundamental principle of bringing about greater agricultural productivity with a resulting increase in the real income of the farmer and hopefully more equitable income distribution. In El Salvador this means instructing and motivating for change the largest percentage possible of the farm families with the programs designed for the adult male, the home-maker and the youth. It also implies the introduction of labor intensive crops that will create greater utilization of scarce land resources.

B. Present Situation

1) The Formation of the Extension Service

The extension service of El Salvador is organized along the traditional lines that were introduced into most Latin American countries. The program was started in 1949 with two agencies being established and has expanded gradually to 69 local offices with 95 extension agents, and 50 home agents in 1971. In addition to being the agency charged with bringing about technical innovation in the agricultural production system, the extension service is the government's principal action agency in the rural community. As such, many agencies were originally opened because of political reasons, i.e., offices were opened in villages because the majority of the people supported the party in power and not because of their needs in terms of agriculture. This has been changed since 1970 when an effort was made to reorient the extension program. What formerly was basically an activity trying to carry out a mixture of social, political and productivity goals has now become more production oriented. Country-wide surveys have been conducted to establish the most feasible location of extension agencies and all existing agencies have been located and future agencies planned on this basis. These surveys take into account land availability, soil characteristics, communications, transportation and community receptability. In addition the country has been divided into regions and zones with their respective agricultural offices and supervisors so that there is more direct support to the local offices with a combined extension, credit, marketing, irrigation, and land

reform program.

2) Emphasis on Basic Crops

The major thrust of the extension programs has been with basic crops. There have been concentrated efforts to increase the production of beans since 1969 and the quantity imported to meet the national needs has been reduced from 50% to about 10%. This program was essential because the conflict with Honduras cut off the traditional source of imports from that country. There have been special programs with special agents carried out separately from the normal extension program in livestock production. Cotton because of its importance as an export crop and because it is a source of labor in this labor-surplus country has received additional attention and is conducted as a special activity and is not presently part of the regular extension service.

The Ministry of Agriculture in order to judge the effectiveness of the program has conducted production surveys in new areas before opening extension agencies. After the agencies have been functioning the same farms are re-studied to obtain an idea of the benefits of the extension program. The following table shows the average results as reported by the Ministry.

Crop	Ave. yield prior to technical assistance Metric tons per ha.	Ave. yield after technical assistance Metric tons per ha.	Increase Metric tons per ha.
Corn	0.95	3.18	2.23
Sorghum	1.15	2.87	1.72
Rice	1.28	3.37	2.09
Beans	0.45	1.34	0.89
Cotton	2.30	2.80	0.50

It is also reported that in addition to yield increases production costs have been decreased through the special program with cotton. Ministry figures show a profit increase of 260 colones (US $105) per hectares after the use of recommended practices. This is important because the laborers share in the increased profit through higher income.

3) Soil Conservation

For several years the extension program has been promoting a program of soil conservation. The problem of soil conservation is extremely important to El Salvador. The population pressure makes it necessary to cultivate all possible land no matter what the slope so that soil erosion is the inevitable result. An organization has been formed called "Amigos de la Tierra" and the extension workers cooperate with them to promote soil conservation by showing small farmers how to build terraces and practice contour planting to reduce soil losses caused by water erosion and to practice other conservation practices. The figures for 1970 show that 2,634 farmers participated in the program and that 2,597 hectares were under the erosion control program. This is a very small percentage of the total arable land in the country but the examples of the activity extend far beyond the actual farmers who are cooperating directly with the soil conservation program. The seeds have been sown to develop an awareness of the problem so that in the future a national program of significance can be launched.

4) Farm Storage

In addition to increased production of basic crops the extension program has been concerned with the on-the-farm storage problem. It has been shown in many studies in various parts of the world that a large percentage, often estimated at 15-25% of grain production in lesser developed countries, is lost during storage through rodent and insect damage. The extension program has stimulated the construction of 500 grain storage bins each with a capacity of 1,125 kilos. Craftsmen in the local villages produce the bins with material provided by the extension service and they are sold to the farmers for the equivalent of $15.20 with only a $3.50 down-payment being required. In addition to reducing storage losses this program allows for more orderly grain marketing. With on-the-farm storage the producer does not have to sell at harvest time but can wait for higher prices to sell his surplus crop and also have a safe place to store the grains for his own use.

5) Home Economics

The home economics program is an important part of the extension package. According to the annual report of MAG, 1970/71 there were 2,620 rural housewives organized in 137 local associations. These local associations are organized by the home agents with the purpose of

teaching and demonstrating to the members of the association skills that lead to better nutrition including the production of fruits and vegetables in home gardens, the utilization, preparation and preservation of those foods in order to improve the family diet. They are also taught home improvement practices and simple sewing methods. The association members learn improved ways to raise and care for swine, chickens and rabbits. It has been shown that often the housewife is more receptive to modern technology and will accept outside advice more readily than the head of the household. The assistance given is simple but can bring about fundamental changes in the family life. For example, the majority of the homes in rural El Salvador consist of windowless one-room houses. Meals are cooked over a wood fire in the corner of the room there being no stove and no chimney. The home agents have developed a simple wood burning stove that can be constructed with local material that conserves scarce fuel and keeps the smoke out of the house. Windows can then be added and the home becomes a more pleasant place to live. The stove provides the means so a more nutritious and tasty diet can be prepared for the rural family. Beans have been called the poor man's beef and traditionally have provided the major source of protein to the lower income diet. One problem is they have to be cooked for a long period so that the stove being promoted by the home economists has a great deal of significance in terms of saving scarce fuel. It has proven to be a very good first project for new members especially during the rainy season when a fire cannot be built outside.

6) Nutrition

a) Dietary Requirements

The diet and dietary deficiencies are tremendous problems in El Salvador and because of population pressure may become increasingly so. The principal energy foods are rice and corn with beans as the major source of protein. The chart below shows that more than half the population is deficient in total calories and 80% receive insufficient protein in the diet.

Evaluation of Apparent Consumption Rates of Calories and Proteins in El Salvador

	Breakdown according to income levels				
	Low 50%	Med. 30%	High 15%	V. High 5%	Aver. age
Total calories	1335.8	2124.6	2731.1	3824.5	1906.2
Calorie requirements	2083.3	2083.3	2083.3	2083.3	2083.3
	64	102	131	184	91
Total proteins (g)	28.2	47.4	64.3	96.3	42.6
Animal proteins (g)	4.4	9.5	20.1	43.2	10.2
% Animal protein	16	20	31	45	24
Total protein utilization (est.)	60	60	75	75	60
Digestable protein - net (g)	16.9	28.4	48.2	72.2	25.6
Protein requirements reference (g)	32.5	32.5	32.5	32.5	32.5
% of needs	52	87	148	222	79
% calories from proteins	8.4	8.9	9.4	10.1	8.9
1/ NDpCal. %	5.0	5.3	7.0	7.6	5.3

1/ NDpCal. % adequate value for El Salvador 6.2

Source: Servicio de Investigaciones Dieteticas, Division de Nutrición Aplicada, INCAP

NDU: Net protein utilization

b) Vegetable Protein

The extension program through cooperation with the research workers is attempting to attack this problem and find solutions for the lack of production that is a factor in the under nourishment of such a large sector of the population. The problem is complicated by the fact that beans, the protein source, are expensive in this country due to the high support price placed by the government as well as relatively inefficient production. A recent unpublished INCAP study in Guatemala shows that despite the fact that beans are often the only source of

protein in the poor man's diet they have a high degree of consumer demand price elasticity although much less than that shown by meat. The study reported that people in the lower 50% of the population as divided by income distribution consumed an average of 19 grams of beans per day. The upper 30% consumed 31 grams, the upper 15%, 41 grams and the upper 5% an average of 55 grams per day. Meat consumption varied from 7 grams a day for the lower 50% of the population to 112 grams for the upper 5% of the population as judged by income. These figures do not directly apply to El Salvador but evidence shows that consumers in the low income groups are limited as to the amount of beans that are included in their diets.

The extension program is attacking this problem on two fronts. They are emphasizing improved technology for bean production and are carrying out massive demonstrations in an attempt to introduce an improved technological package to the farms. In addition, the combination research-extension approach has introduced the southern pea into the country and preliminary results indicate that it will be successful. Production is higher than field beans and a variety has been identified that is highly resistant to diseases and insects. In addition the field pea has a higher protein content than the traditional field beans. Consumer acceptance has been tested and found to be good both in the rural areas and in San Salvador. The problem of seed multiplication to provide sufficient seed of the particular variety for general introduction is now being carried on and in a few years this additional source of vegetable protein should be widely available.

c) Fish Culture

The production of fish in small farm ponds has been researched by Auburn University under a USAID contract. It has been found that tilapia will do well under Salvadorancan conditions and provide an additional source of high quality protein in the diet. The extension program is developing a project that will provide technical assistance in the construction of fish ponds and information on fish culture. It has been shown that fish ponds can be constructed in most areas of the country and 3-4 crops of fish can be harvested annually. This program will be given impetus by the recent transfer of two fishery specialists from the division of natural resources to extension.

7) Youth Programs

In addition to the adult programs farm boys and girls are organized into local 4-C clubs similar to the 4-H clubs in the U.S. There are 269 4-C clubs with 5,528 associates. They have the support of local industries organized into a National Committee for the support of the youth clubs. The committee assists the program in many ways, one being that club members are loaned money from a private fund established by the committee for farm and home projects. The profit from the project is used to pay back the loan. The organization has proven successful in helping develop rural youth through a local volunteer leader program assisted by the extension service. The program should be expanded and strengthened.

8) Livestock Production

In addition to the examples of the activities mentioned above the extension service is promoting forage and pasture programs in the area of the country suitable only for livestock. An improved system of cheese production is being demonstrated to the small livestock owners in the remote areas of the country. The control of animal diseases is another important activity and bi-annual vaccination programs are organized.

9) Mass Programs

The extension service also carries out annually an intensive mass training program when an attempt is made during 15 days to contact people not regularly reached by the extension service. Last year (1971) 28,900 farm families were contacted during this special campaign. In addition to providing these people with technical information, interviews were conducted to determine their technical knowledge of improved agricultural practices. It was found that only 1,800 of them had any knowledge of soil conservation practices. There were 7,000 of them using chemical fertilizers but the average rate of application was only 10% of that recommended by the extension service. Other information about their agricultural practices and their resource base was obtained and this will help the Ministry decide where new offices should be established and what priority should be given to the various communities.

C. New Goals

1) Expanded Program

The Ministry of Agriculture will increase the number of extension agents, home economists and 4-C agents as well as improve the quality of the existing personnel. Specialists will be added to the staff in the various important activity areas. It is intended that the program will be reoriented more toward production goals with less emphasis on projects with primarily a social or community development aspect. Goals have been established indicating the target for the number of farmers to be contacted through the program and the number of hectares of crops to be grown under the direct supervision of the extension agents during the period 1972-77. These goals indicate an increase from 9,737 farmers contacted directly by the program in 1972 to 39,854 in 1977. Goals for the production of labor intensive fruit and vegetable crops go from 450 has. in 1972 to 7,000 has. in 1977. The target goals also indicate significant increases in the basic food crops. (Annex III Exhibit H).

2) Mass Communications

Another emphasis will be on the increased utilization of mass communication methods so that more people can be reached by the program. This includes plans to utilize radio programs, film strips and movies. It is planned to incorporate massive T.V. programs once the government's Instructional Television system becomes operational in the rural schools of the country. The traditional methods of bulletin preparation and distribution that give information about improved technological practices will be continued, the communications center to be constructed under the AID loan to CENTA will provide the resources to develop greater quantities and more suitable materials for distribution. Research results about new crops or improved varieties will be put into the form that can be understood by the rural people and distributed as part of organized campaigns to bring about change.

3) GOES Goals

The basic change from the existing program goals will be the emphasis upon employment generation in the rural sector though the introduction of labor intensive crops and more equitable income

distribution. Increased productivity of basic crops will also be stressed but to a lesser degree. The overall goals of improved rural life which is being stressed by the GOES will be the single most important factor that will determine the direction that the program will take since the extension service is the principal government action agency in the rural areas of the country.

D. Limitations

1) a) Training Level of Agents

One of the limitations inhibiting the success of the program as well as one of the strong points that has won support is the level and type of training received by the extension agent. The preparation at only the junior college level precludes them from graduate training without additional undergraduate training, but the practical knowledge gained through this type of preparation makes them uniquely qualified to deal with the small and medium sized farmers. Many of them are from the rural areas and their training has taught them the dignity of work so they can relate to the agricultural producer. In addition the strongest part of this practical preparation is in the production of fruit and vegetable crops so they are technically prepared to assist with the development of labor intensive crops. One training limitation has been in livestock production because of lack of facilities at the school, however this loan project will assist in developing an improved animal science curriculum. This training is essential since about 25% of the country can only be used for livestock production and this area should be managed to produce at a much higher level than is presently the case.

People are needed in the program with more training to fill the necessary administrative and supervisory positions. Part of the extension specialists should come from within the program. The grant program that will support this project is going to make a major effort to provide the necessary academic training outside of the country for all three sections of CENTA. (See Annex IV Exhibit A). In the case of the majority of the extension agents who are ENA graduates they must take two years of additional training to get the equivalent of a B.S. degree so this will mean a two-step training process in order to get a M.S. degree. It is expected that the first step will be completed in El Salvador at the university, in Mexico, Puerto Rico or a South American country. In some cases academic training will not be indicated. It is expected that attendance at seminars, conferences, etc.

will become a Ministry responsibility with the Mission using its scarce resources for the degree training programs that are judged to be essential.

b) Crop Promoters and Specialists

The question has been asked if the extension program in El Salvador should not consider a program of crop promoters with special training in specific crops. This does not seem to be an economical way to solve the problems of agricultural technology transfer in this country. The farmers are a homogeneous group living on small land holdings and all growing several different crops. The crop specialized promoter would be uneconomical since various promoters would have to visit the same farm. It also should be pointed out that one of the principal obstacles to the introduction of improved technological practices to a rural society in an under-developed country is the lack of acceptance of the innovator by the producer. Not until acceptance takes place are the technological improvements tried. It has been decided in El Salvador that the extension agent concept should be followed since it is easier for one person to be accepted than several. The department approach within CENTA will provide specialists from research or education as required by the extension service. To cope with problems beyond the training level of the agent, five specialists have now been assigned to the program in the fields of basic crops, vegetable production, beef cattle, dairy cattle and rural youth. To be named as they become available are specialists in the fields of food legumes, fruit production, swine production, poultry and small animals, soil conservation, agricultural economics and home economics.

c) Personnel Transfers

In addition to the existing staff serving extension the Ministry is transferring 51 technicians now working in other areas of agricultural development. They will be available to work through the extension program with special projects in the fields of their specialties. These include crop diversification, irrigation and draining, soil conservation, fish culture, livestock, and the cotton and bean programs.

2) Vehicles

One of the major limitations facing the extension service is the lack of vehicles. There are 16 vehicles assigned to the extension agencies and only two of these are considered, by unbiased judges, to be in good condition. Age could be a factor since three of them are 1956 models and three are 1960's. The average age is 8.4 years with only two 1970 models. In addition to the four wheel vehicles the CENTA extension service has recently purchased 28 motorcycles for the rural youth program. The lack of vehicles is of great significance since a study has shown that in the present program an agent with a vehicle reaches an average of 158 farm families who farm 495 hectares in contrast to the agent without transportation who only has direct contact with 68 families with 74 hectares in cultivation.

The loan to the CENTA project will provide 100 jeeps, 33 pickup trucks, 10 panel trucks, 3 buses and 2 sedans for the extension program. This will provide the mobility so that the extension agents, home economists and youth club agents can contact more people, hold more meetings and demonstrations and in general do a more effective job. It is estimated that one agent with a vehicle in good state of reapir can work effectively with 250 farmers with 750-800 ha. of land in cultivation. The panel trucks will be equipped and utilized as mobile units for movie and slide projections in the rural areas throughout the country. This is an extremely effective way of influencing people in rural areas not satiated with TV or the movies. A special series of film strips have been filmed and prepared in El Salvador that are very successful in bringing about technical change.

3) Technical Assistance

Technical assistance to the extension program is a limiting factor. USAID through a PASA arrangement has been providing one full-time technician and some short-term advisors in specific areas. It is intended that this assistance will continue but be reoriented to meet the changing program goals. Peace Corps Volunteers have been providing technical assistance to the extension service and it is anticipated that this effort will be expanded. Several volunteers have been working with extension personnel with notable success. A request has been made for specialists in the production of vegetables so that the production of these labor intensive crops can be more rapidly expanded. It has also been proposed that the Peace Corps could

provide technical assistance in the packaging, handling and marketing of vegetables. This relatively new field will require considerable assistance from some source because production alone is not the answer. Technical assistance in special areas has also been provided by FAO. It is expected that this assistance will continue and be reoriented to coincide with the stated GOES goals. The extension service has cooperated closely with the IICA program and they look to that organization to give continued support to this activity. This assistance is of special importance because it is based upon the experience that IICA has gained in Central America.

4) Relocation of Agencies and Construction of Supporting Centers

One of the past limitations to the program was the irrational location of the extension agencies. This has been solved through a comprehensive study of the country and a subsequent location of the local offices in the most strategic places. The country has also been divided into regions and zones that are the administrative offices and the technical resource bases for the local extension agents, home economists and youth club workers. This project will finance the cost of construction of the four regional offices and 21 supporting offices. These buildings will provide space for group meetings and demonstrations. The buses purchased under the loan will bring people from the more remote villages to these centers for special courses. The regional and zonal offices will also be agricultural service offices combining the activities of the various ministry entities such as credit, marketings, and irrigation and drainage. As stated elsewhere in this presentation, the Ministry intends that CENTA will become the action arm of the Ministry. These new centers by providing common office space will bring the organization together physically and should create greater cooperation. Local locations are also badly needed since many of the rural communities where the extension offices are located do not have suitable quarters that can be rented. The Ministry intends to build local offices at some locations during the next five years. Better working conditions will also tend to reduce staff turnover among the agents and home economists.

5) Salaries

In the past the large turnover of extension agents and home economists has been a problem in developing an effective program. One

of the causes was low salaries but even more important has been the differences in salary levels between different sections of the Ministry for people with the same training and abilities. Technicians would start with extension and then at the first opportunity, transfer to the credit program or grain marketing. This has now been changed with a system of comparable salaries throughout the Ministry and the autonomous agencies. Salaries have also been increased and annual 5% increments are projected. See Annex III Exhibit I for the new salary scale.

6) a) Expansion of Service

Because of the geographic characteristics of El Salvador it is believed that the present 69 offices are insufficient to provide the technical assistance necessary to promote the production of intensive crops and to increase production of the basic crops. It is planned therefore by the Ministry to expand the number of agencies to 75 by the end of 1972, to 100 by 1977 and to 125 by 1980. This will give complete geographical coverage and will allow the extension service to reach all the farmers of the country. The expanded technical staff will number 610 in 1977.

b) Local Leaders

A limiting factor of an extension program in any country is the number of personal contacts with individual farmers. The CENTA extension program has recognized this and their future programs will be designed to reach people in other ways. The mobile units are one form but another will be the intensified use of local committees, agricultural cooperatives and the tenant farmers group. Key farmers will be trained who in turn will be able to demonstrate the new production techniques to others. A successful introduction of a new profitable crop will be copied by the people who live in the neighborhood. If the extension program can effectively reach 10% of the farmers of the country important changes will take place.

7) Increased Production

As discussed, the limitation of the introduction of new labor intensive crops is dependent upon land being made free for their cultivation. This calls for increased unit production of traditional basic food grain crops. It also requires double and triple cropping of land now used only once during the year. Research work has shown

that it is possible to grow a crop of corn, followed by sorghum and then by southern peas if the proper management techniques are utilized. In addition, the extension service will be concentrating its efforts on existing irrigation projects and new projects that are to be established. El Salvador can produce more basic food grains and can develop a whole new series of labor intensive crops. The extension agents will be the technological transfer persons who will play a critical role in this process working in close cooperation with research and training.

8) Unified Approach to Development through CENTA

The CENTA organization will have to work as a unified team if this is to be a success. The construction of the new facilities and moving extension and research to the school location will be helpful. The school is already playing a key role in training extension agents for the service. In the future they will also be called upon to train the home economists going into the program. They will also be conducting intensive short courses for the agents to provide them with new skills and with refresher training. The departmental division of CENTA will allow extension to call upon both research and education people to help them solve the problems encountered in the field. This is the only program in Central America that combines the traditional "land grant" college approach of research, training and extension in one organization attempting to solve the problems of agriculture. This unified approach appears to be the most logical way to bring about important changes in the agriculture sector of El Salvador which will lead to increased employment, more equitable income distribution and greater overall production.

NOTE: See Annex III Exhibits J and K on Crop Yields in Central America and Impact of Direct Service by Extension on Crop Yield.

V. THE EDUCATIONAL DIVISION OF CENTA

A. Objectives

The central objective of the National Agricultural School, (formerly ENA), the educational division of CENTA, is to provide agriculatural training for young men to meet the agricultural technician manpower needs of the Ministry of Agriculture and the private sector of El Salvador. These manpower needs include: research, extension, teaching, credit, marketing, irrigation and drainage, conservation of natural resources, agri-business and production agriculture.

The secondary objective of the school is to provide short courses and other in-service training for extension and research personnel, agriculture teachers, home demonstration agents, students, farmers and farm wives.

B. Present Situation

1) Background

The educational division of CENTA provides a three-year, post-high school general agricultural curriculum for 250 students. The school began in 1956 and since then has produced 679 graduates (See Annex III Exhibit L). The training received by the students is a combination of theoretical and practical learning experiences. They attend classes five afternoons a week (1 p.m. to 5 p.m.). During six morning a week (7 a.m. to 11 a.m.) they have an opportunity to put into practice in the fields, barns and shops what they have learned in the classroom. This type of training produces a graduate with practical as well as theoretical experience. Graduates with a combination of practical and theoretical training have proven to be a valuable asset to agricultural development in Latin America due to their credibility with the farmer clientele. This is the only institution in El Salvador that produces graduates with this preparation.

The title presently received by the graduates is Agronomo (agronomist), and in Latin America usually means an agricultural technician who has successfully completed a three-year post high school general agricultural curriculum. A recent survey revealed that 64% of the agronomos who have graduated from the school are presently

employed by the Government of El Salvador in the Ministry of Agriculture and the autonomous governmental agricultural institutions. The remainder are mostly employed in agri-business and production agriculture. The curriculum provides the students with training that prepares them for immediate employment with little in-service training being necessary. Some of the better graduates, however, have had the opportunity to receive additional academic training at the Bachelor of Science and Master of Science level and have therefore elevated themselves from the technical to the professional level.

The academic year begins in January and ends in December with one month vacation. The curriculum consists of 48 courses which are divided into six teaching departments: agronomy, animal science, horticulture, agricultural economics, agricultural math and engineering and basic sciences. The teaching staff at the school includes 28 professors and 14 field instructors (See Annex III Exhibit M). All the teaching staff are employed on a full-time basis. The professors teach in the classrooms and laboratories and direct the practical work which is under the supervision of the field instructors.

The Government of El Salvador provides a full scholarship to all students (tuition, board and room). A nation-wide competitive examination is given to prospective students after they have finished their secondary education. The examination is divided into five parts; general aptitude, vocational agriculture aptitude, mathematics, science and Spanish. Students are selected on the basis of their score and to a certain extent on the geographical location of their homes. This assures each department (state) in El Salvador of representation at the institution. It also keeps the enrollment from consisting primarily of students from the better high schools of the urban areas. Students in this way are not penalized because they may have received a poorer primary and secondary education and those from the rural areas are generally more willing to take extension positions in the remote communities. In December 1971, 219 candidates took the entrance examination. Of these candidates 100 were selected to be first year students in January 1972. At the same time 73 second year students and 70 third year students were enrolled for a total enrollment of 243. The greatest attrition comes during the first year for academic and personal reasons.

2) Short Courses

The school also serves as a training institution for extension agents, home economists, technicians from other divisions of the Ministry

of Agriculture as well as farmers and farm wives. In the fiscal year 1971-72 seventeen short courses were conducted by the training division for 282 people. These short courses were for extension agents (communication methods); home economists and housewives (home-making practices); farmers (coffee culture and beekeeping); and food inspectors. Three field days are usually conducted each year at which time hundreds of farmers visit the school to view recommended practices in fruit, vegetable crops, cereals, and livestock production including dairy, beef, poultry, rabbits and bees. They also have an opportunity to observe fruit processing, as well as the processing of meat and dairy products. The school cooperates with the Ministry of Education by training the agriculture teachers for the four new vocational agriculture high schools. These schools function at the secondary school level and their graduates receive the equivalent of a high school education with specialization in agriculture. It is a terminal education, however, some of these graduates undoubtedly will eventually be accepted at the school for college level training.

3) Improvement Programs

The school serves a vital role in the agricultural economy of El Salvador as it is the primary institution for training and specialization of agricultural technicians. In 1969 recognizing the importance of the institution, the Ministry of Agriculture requested the USAID to provide technical assistance under contract with the University of Florida. The original objective of this contract (until CENTA was formed in January of 1972) was to improve the quality of graduates of ENA. The present objective of the contract is to assist in the building of a viable institution for agricultural research, extension and education, CENTA.

4) Advisors

This project has been a "learning by doing" experience for the Salvadoran counterparts, not a "learning by watching" experience. The administrators and staff of the school have been involved with the University of Florida team in the planning, execution and evaluation of all project activities. The project is designed to leave, upon completion, an improved on-going program that will continue to improve under the guidance of the local staff.

In addition to the contract chief of party, the University of Florida has provided 24 short-term advisors to the educational program. Advisors in specific fields were requested by the administration of the school after consultations with the contract chief of party and the USAID Food and Agriculture Officer. This selection has been based largely on curriculum deficiencies at the school and in some cases on agricultural research needs of El Salvador. Each advisor has worked closely with a local staff member. Together they reviewed the particular course outlines, teaching methods and production practices in the subject (fruit crops, entomology, soils, farm mechanics, etc.). After reviewing the local situation and discussing the situation with the staff, the advisor would recommend needed changes in course content, teaching methods and production practices. In most cases the short-term advisor would return to El Salvador at a later date to evaluate progress being made and make additional suggestions. Twelve new course outlines have been prepared by advisors and the local staff at the school and are now in use. Many other course outlines have been improved. New technology in production practices is also evident at the school. Some examples include the introduction of new crop varieties that are resistant to disease and produce higher yields, increased use of fertilizer, herbicides, pesticides and new irrigation practices that allow double cropping.

5) Participant Training

An important part of the project is the participant training program. This is designed to improve the teaching expertise of the staff at the school. It has included in-service workshops (teaching methodology in 1971 and communications in 1972 in cooperation with IICA), scholarships for study abroad and English instruction. At the beginning of the project in 1969 the teaching staff included one at the master's degree level and 17 below the bachelor level (see Annex III Exhibit N). One of the most important criteria used to evaluate an educational institution is the level of education of its professors. Advanced academic training invariably results in advanced technology and improved methods in teaching and research. It also results in a higher status which is just as important in Latin America as it is in the USA. In 1972 the staff includes one Ph.D., two at the M.S. level, 17 at the B.S. level and only eight below the B.S. degree level. In addition, six staff members are presently enrolled in degree programs (two M.S. and four B.S.). Three others are enrolled in technical courses in library science and farm mechanics. AID scholarships for undergraduate study abroad have been provided only in cases where training in specific fields is not available in El

Salvador. The participant training program at the school has been the most active within the Ministry of Agriculture. It is still not adequate, however, since the professional teaching staff includes 62% below the M.S. level.

6) Instructional Materials

A study of instructional materials available in 1969 revealed a critical need of teaching material and visual aids. There were not enough textbooks in any single subject to provide all class members with a book. Few reference books in the library were pertinent and up to date. The school has obtained through the project many bulletins, references and textbooks (Spanish and English), periodicals, film strips, films, projectors and other teaching aids. Despite these acquisitions, library facilities are still inadequate and will be improved under the loan project.

Many improvements have been made as a result of the AID financed technical assistance. Constant evaluation of teaching methods and production practices, however, reveal additional room for improvement. The University of Florida team now includes five long-term advisors in the fields of: plant pathology, agronomy, agricultural economics, agricultural education and dairy science. These five areas were selected by the Minister of Agriculture as those with the highest priorities in the new CENTA program. The five contract employees are assisting the respective chairmen in coordinating the research, extension and educational activities within their departments. The project also includes a limited number of short-term advisors to complement the efforts of the long-term advisors available to assist CENTA.

7) University of El Salvador

The Faculty of Agronomic Sciences at the University of El Salvador offers a five-year professional curriculum leading to the Agricultural Engineer Degree. About 80% of the researchers in CENTA are graduates of the University and the educational division collaborates on an informal basis with the faculty. This has involved an exchange of facilities since the school has the land and livestock for field research and the university has more complete laboratories. Very few ENA graduates have continued their education at the university due to the desire to be able to specialize at the undergraduate level which is not possible in El Salvador. It also takes three additional

years to receive their degree at the University of El Salvador while only two additional years are required at many universities in the U.S., Mexico or Puerto Rico. The B.S. degree from the U.S. is considered equivalent to the Ingeniero Agronomo degree conferred by most universities in Latin America. The Ministry of Agriculture is presently preparing an agreement that will facilitate a closer working relationship between CENTA and the University of El Salvador. This presumably will enable ENA graduates to complete their degree in as little as two years.

8) Facilities

Present buildings on the ENA campus (Annex III Exhibit O) include a classroom building, administration building, four dormitories, a warehouse, dining hall and kitchen, farm shop, food processing building for fruit,vegetables, meat and dairy products, milking parlor, feed mill, barns for swine, dairy, beef and poultry, horticulture office, 10 houses for professors and three houses for other personnel. Living facilities for watchmen and field labor are few and inadequate.

In 1969 a ¢1,714,000 ($685,600) loan was negotiated with the World Bank (IBRD) through the Ministry of Education for expansion of teaching facilities at CENTA. Additional facilities were needed to (1) improve the quality of instruction and, (2) to accommodate an increase of enrollment from 250 to 450 students. The justification for enrollment increase is shown below. Major new construction underway with the IBRD loan includes four student dormitories, a classroom - laboratory building, a farm mechanics shop, a milk processing plant, a milking parlor, a swine unit, a greenhouse, two silos and a feedlot (Annex III Exhibit P).

C. New Goals

The new goals of the school are to increase the number of graduates of the three year course from the present, approximately 75, to 100 per year. In order to do this teaching facilities will be expanded and more students will be accepted each year. Equally important, the training of the students will be oriented to meet the GOES goals, i.e. increased employment, more equitable income distribution and greater agricultural productivity. To accomplish this there will be greater emphasis in the curriculum on the production of labor intensive fruit and vegetable crops and the introduction of improved

varieties of the basic crops that will lead to increased production. In addition, the retraining of extension agents and home economists to help meet these goals will be emphasized. Greater cooperation will be emphasized between the research, educational and extension divisions of CENTA.

D. Limitations

1) Curriculum

The teaching curriculum must be adjusted to include the new emphasis on diversification and intensification in order that the graduates of the school are better prepared to meet this new emphasis in extension and research. New emphasis will be placed on courses that include intensive food production such as vegetables, fruits, double and triple cropping with irrigation, small animal production (rabbits, poultry, bees, pigs, goats), fish ponds, and beef and dairy on marginal land unsuited for other production.

The curriculum will also include increased emphasis on extension and research methodology in order that the graduates have the working tools for their profession as well as the necessary technology. It is also possible that the curriculum will be adjusted in 1975 to include a limited fourth year program (35 students). The fourth year would enable top students to specialize in certain areas and thus be better prepared to fit into the extension specialist program.

The present staff is not adequately trained to adjust the curriculum to meet the new emphasis on intensification and diversification. An on-going training program is in effect, however, to meet the immediate needs of curriculum adjustment. Technical advisors from the University of Florida will continue to assist in the curriculum improvement program.

2) Enrollment

A manpower survey was conducted recently (April 1972) among employers of ENA graduates (GOES and the private sector) in order to determine if the number of graduates the school was producing is sufficient to meet the demand for agronomos. The projection for increased personnel in the Ministry of Agriculture, particularly in

extension and research clearly indicated a demand for a larger number of agronomos each year. In addition to the survey, employment trends shown in Annex III Exhibit Q also reveal increased need in the private sector for graduates of the school.

The Administration of CENTA after studying the manpower survey and employment trends, determined that the enrollment at ENA should be increased from 250 to 450 to meet the demands for new agronomos by the Ministry of Agriculture and the private sector. Enrollment will be expanded gradually in the next five years as is shown in Annex III Exhibit R . The chart allows for normal attrition and also for the fourth year program to begin in 1975.

The total cost to the government per student is ¢3,160 per year ($1,264). Annex III Exhibit S , which shows the present and proposed budget for the school, is a projection of the cost per student during the next five years as facilities are expanded and enrollment and personnel are increased. It is expected that cost per student will decrease to ¢2,500 ($1,000) by 1977.

3) Teaching Personnel

The increased emphasis on intensification and diversification creates two major limitations for the teaching personnel. The first is in the area of preparation and the second in terms of sufficient numbers to properly teach the expanded enrollment.

Professors must receive additional training in intensive and diversified crop and livestock production. They also need additional training in extension and research methods. This additional training will enable them to adjust their teaching program and produce a graduate who is better equipped to meet the new emphasis on intensification in extension, research and the private sector. It will also allow them to function more effectively as members of the departmental staff.

The teacher training program will have to be maintained in order to continue to raise the level of competence of the teaching staff. This will continue to be a cooperative effort of the GOES, USAID, and other agencies such as IICA, OEA, FAO, etc. The GOES maintains salaries for participants and provides travel expenses. Participants will continue to be sent to institutions best suited for their training needs. Four professors and one instructor are scheduled for advanced training in 1972 (3 for master's degree and 2 for bachelor's).

The second limitation involves an adequate number of professors and instructors to properly teach the expected expanded enrollment of 450 students. The number of students per class presently range from 35 to 50. As student numbers increase, additional professors and instructors will also be needed. Annex III Exhibit M reveals that seven additional professors will be added to the staff between 1973 and 1976. The overall student-professor ratio is presently 10 to 1 and according to the projection will increase to 15 to 1, an acceptable ratio for this type of institution.

4) Buildings and Equipment

The present buildings and equipment for teaching purposes and general services (including those under the IBRD loan) will be inadequate to meet the needs of an expanded enrollment (250 to 450) and the new emphasis on intensification and diversification. Present buildings must be remodeled and new facilities constructed in order to provide the proper educational environment that will enable the educational objectives to be achieved.

An additional classroom - laboratory building will be needed to keep the classrooms from being overcrowded and to provide adequate laboratory space where research and laboratory techniques can be taught. A women's dormitory is scheduled for construction in 1974. This is needed in order to accommodate the home demonstration agents scheduled for in-service training and housewives for short courses. Later it will be used for home economic students at the undergraduate level, a program to begin at the school possibly by 1976.

Facilities for animal science research and teaching are non-existent. The new emphasis on intensification of livestock production, particularly small animal production and cattle production on marginal land unsuitable for other purposes, requires laboratory facilities for research and teaching in nutrition, physiology, genetics, diseases and parasitology. Additional support facilities needed for teaching purposes are two seed drying platforms, two agronomy warehouses and a small office and storage building in the horticulture department.

The existing equipment at ENA including teaching aids, laboratory equipment, texts and reference books and farm production equipment plus the equipment to be secured with the IBRD loan are not adequate for the expanded enrollment and the adjusted curriculum that will include the new emphasis on intensification and diversification.

Additional teaching equipment for classrooms, laboratories and library and farm equipment are needed for the learning process to be most effective.

It was mentioned earlier that the library facilities were very deficient. These facilities are being remodeled but many new reference and text books must be added to meet the needs of expanded enrollment, new emphasis on intensification and diversification and, research and extension personnel who will begin to use these facilities.

There are certain general services that are inadequate or lacking altogether that are necessary for an efficient educational institution. Due to its rural location (33 kilometers from San Salvador) the electric service at ENA is grossly inadequate and an internal communication system is non-existent. Certain laboratory facilities and instructional aids are dependent on a constant, dependable source of electricity.

There is also a need for equipment to assure potable water, sewage disposal and liquid manure disposal. The latter two facilities will improve fly control and sanitary conditions.

5) Greater Coordination with Research and Extension

It is very important that personnel in research, extension and education work closely together. The teaching program must be current and adapted to the needs of research, extension and the farmers. Research must be directed toward solving the problems of the farmer. These problems must be brought to the attention of research by extension personnel who are in contact with the farmers. Extension, in turn, takes technology from research and education to the farmers.

Note: See Annex III Exhibit T for details on new salary scale.

VI. Engineering Feasibility

A. Description of Facilities

The Ministry of Agriculture technical advisors, as well as international advisors from A.I.D./USDA, and FAO have provided assistance to the CENTA architectural and engineering staff in the preparation of the preliminary plans and cost estimates for the buildings and equipment to be included in the project. (Construction estimates are based upon current construction prices in El Salvador). A 15% provision for price increases in labor and materials has been included in the project.

The total facilities to be constructed at the San Andrés complex of CENTA are listed below with the construction and equipment cost estimates.

ADMINISTRATION - CENTA

Unit No.	Description	Construction Cost	Equip't Cost	Furniture Cost	ANNEX V Page
1.	Administration Bldg.	46,400	28,320	8,400	11
2.	Executive Bldg.	83,800	-0-	15,500	12
3.	Communication Center	6,900	37,760	-0-	15
4.	Information Center	58,000	225,380	21,000	16
5.	Agricultural Machinery and Vehicle Maintenan.	53,700	-0-	-0-	20
6.	General Services Bldg. Maintenance	25,500	25,000	-0-	21
	Radio Equipment		33,040		76
	Total Administration$	274,300	$349,500	$44,900	$668,700

RESEARCH

Unit No.	Description	Construction Cost	Equip't Cost	Furniture Cost	TOTAL	Annex V Page
7.	Short Term Technician's Quarters	42,500	-0-	-0-		23
8.	Plant Science	404,800	150,356	73,900		24
9.	Chemistry	256,500	189,517	44,850		29
10.	Animal Science	281,700	67,453	50,400		30
11.	Social Science	105,800	33,040	21,000		37
12.	Cow Stable	16,100	-0-	550		38
13.	Corrals for feeding and Resting	31,200	-0-	-0-		41
14.	Concentrates (Mixing)	8,500	-0-	450		42
15.	5 Green Houses	276,000	-0-	-0-		44
16.	Insectary	77,200	-0-	-0-		45
17.	Agricultural Engineering	49,700	147,453	9,040		47
18.	Bull's Stable	18,400	-0-	-0-		48

RESEARCH AND EDUCATION

19.	Hay Barn	14,700	-0-	-0-		51
20.	Beef Cattle: Office & Storage	10,300	-0-	450		52
21.	Green House Work Ct.	20,700	-0-	1,050		54
22.	Poultry House	9,200	-0-	-0-		55
23.	Incubation House	13,800	-0-	850		55
24.	Broiler Poultry House	9,200	-0-	-0-		57
25.	Egg Layer Poultry House	6,900	-0-	-0-		57
26.	Breeding Poultry House	6,900	-0-	-0-		55
27.	Library	108,000	27,748	21,000		60
	Total Research	$1,768.100	$615,567	$223,540	$2,607.207	

EDUCATION

28.	3 Auditorium Classrooms	63,250	-0-	2,100		61
29.	Women's Dorm.	154,100	-0-	5,250		63
30.	Men's Dorm.	80,000	-0-	5,250		64
31.	Home Econ: Rural Model House	3,450	1,558	730		67
32.	Remodeling Dining Fac.	23,000	-0-	-0-		68
	Additional Educ.Equip.	-0-	100,837	-0-		77,78,79
	Total Education	$323,800	$102,395	$13,330	$439,525	

These buildings will be built at the location shown on the map presented in Annex V, page 9. In accordance with these estimates up to US $ 1,185,000 will be available for construction and up to US$ 1,217,500 for equipment purchases from loan resources. All construction funds should be obligated by December 1975. Annex V Page 7 contains a project and construction time schedule for the construction at the San Andrés site.

The field facilities to be constructed for the extension units are listed below with construction and equipment cost estimates.

EXTENSION

Unit No.	Description	Construction Cost	Equip. Cost	Furniture Cost	Total	Annex V Page
33.	4 Regional Centers	92,000	12,980	5,100		70
34.	21 Supporting Centers	705,200	59,472	35,500		72
	Total Extension	797,200	72,452	40,600	910,252	
	Total: Construction and Equipment Facilities	$3,163,400	$1,139,914	$322,370	$4,625,684	
	Construction Design and Supervision (overall project)				$120,000	

The extension facilities will be built at the locations shown on the map presented in Annex V, page 10. In accordance with the cost estimates up to US$ 400,000 will be available for construction and up to US$ 96,000 for related field equipment purchases from loan resources. All construction funds should be obligated by December 1975. Annex V, page 7 contains a project and construction time schedule for the Extension construction project including the Regional and Supporting Centers.

B. Engineering Plan and Technical Feasibility

Preliminary plans and reasonably firm cost estimates have been prepared by the CENTA architect and engineering division and

reviewed by the Mission. In addition, a consultant satisfactory to A.I.D. will be employed, under the loan, by the CENTA to assist in the preparation of the final plans and specifications and to supervise construction. It is anticipated that the cost of consultant services required for final design and supervision will be US$120,000 and provision has been made to include this financing under the loan.

Construction will be by public bidding by prequalified contractors from local and code 941 countries. GOES standard prequalification and bidding procedures are similar to the procedures required by A.I.D. and no difficulty is foreseen. The buildings will be bid for and constructed on stages in accordance with the priorities established by the Ministry of Agriculture. The Ministry of Agriculture and CENTA will prepare, with their technical consultants, all bid documents and advertisements for call for bids, as well as review the bid submissions.

Alternative bids will be taken on the work at the San Andres site to determine the most advantageous size of contract packages. At the regional and zonal sites the structures will be erected under separate contracts.

C. Monitoring of Engineering and Construction

All monitoring will be carried out by the USAID Mission's General Engineer, with the collaboration from ROCAP and AID/W.

All plans, specifications and contracts related to construction and procurement of equipment will be subject to A.I.D. approval prior to disbursement against the contracts under the loan. Notice of all proposed construction will be advertised in the U. S. Commerce Business Daily in accordance with normal A.I.D. procedures.

Construction material and trained construction workers are readily available throughout El Salvador and the construction of the San Andrés facilities and field offices pose no problem from this standpoint.

The type of construction used will be of reinforced concrete and structural steel designed to resist the seismic forces common in El Salvador. The water supply at San Andrés is adequate to

supply laboratory, dormitory and classroom needs without any problem. At the regional field centers water will be available by commercial supply or by well; there is power available at all sites. No special problems are anticipated with the specific sites chosen or with the construction to be undertaken.

D. Maintenance

The CENTA has a good maintenance program as it has incorporated the already existing staffs of the research and education (ENA) departments of the Ministry of Agriculture. The maintenance department at San Andrés, which has been responsible for the upkeep of all the ENA classrooms and dormitories including the buildings constructed under the IBRD loan program, have performed very well in maintaining the facilities.

The CENTA administration will continue the same kind of maintenance program with the expanded facilities using budgeted funds.

E. Engineering Conclusions

The requirements for preliminary plans and reasonable cost estimates have been met. The final plans, specifications and contract documents will be prepared under an A.I.D. approved contract. A Mission review of the background and experience of a number of Salvadoran architecture firms connected with the IBRD project at San Andrés and other A.I.D. program indicates that they are qualified to complete final design and supervise construction of the project.

A comparison has been made of the construction costs estimated under this project (unitary costs) with similar construction work undertaken in past A.I.D. loan projects (A.I.D. loan 519-L-011 American School; A.I.D. Loan 519-L-014 Education Reform) and with present unit costs used in the Salvadoran construction industry. This analysis has indicated the reasonableness of the cost estimates presented herein.

The project meets the Technical Criteria required by FAA Section 611. (The detailed Engineering and Construction Analysis is presented in Annex V).

F. Vehicle Purchases and Maintenance

The following is an estimate of the vehicles that will be

purchased under the loan program. Prices are based on recent purchases related to A.I.D. loans in Central America. Provision has been made for increases in price estimated at 5% per year. Costs include 10% provision for shipping and 10% for local commisions and preparation.

No.	Description	Unit Price	Total
	RESEARCH		
51	Jeep CJ5	$3,500	$178,500
2	Trucks (4T)	6,500	13,000
5	Micro-Buses	4,600	23,000
	Sub total Research		$214,500
	EDUCATION		
2	Pick-ups	4,300	8,600
	Sub total Education		8,600
	EXTENSION		
2	Compact Car	3,500	7,000
100	Jeep CJ5	3,500	350,000
33	Pick ups	4,300	141,900
3	Micro-Bus	4,600	13,800
10	Panels	3,700	37,000
	Sub total Extension		$549,700
	Total cost of vehicles		$772,800

Vehicle Maintenance

Vehicle maintenance at the ENA and CENTA has proven in the past to have been carried out in a satisfactory manner. Despite the age of existing vehicle fleets (average 6-7 years), present vehicles have been well maintained and kept in running condition. With the planned expansion of the vehicle fleet, the Ministry will augment the budget by an average of 10% per year to absorb the increase. Provision has been included in the present paper to expand the maintenance building (US$ 25,500) and US$ 25,000 has been included to buy related vehicle and maintenance equipment.

PART FIVE: LOAN ADMINISTRATION

I. Implementation Plan Negotiations

A. Loan Agreement

It is estimated that between 90 and 120 days will be required for loan negotiations once a draft has been prepared by USAID and the Regional Legal Advisor/ROCAP and presented to the Ministry of Agriculture and the National Planning Council. The Ministry must receive authorization from the National Assembly to enter negotiations related to foreign borrowings and to sign loan agreements. The CENTA reorganization plan and budget requests have received bi-partisan support in the past and the President-elect and his party strongly support the development of the CENTA institution, as well as, other agricultural development programs. Consequently, the USAID does not envision any significant delay in the Ministry receiving authority from the National Assembly to negotiate and sign the loan agreement.

Implementation Letter No. 1 will be prepared with the loan agreement and discussed with the Borrower as part of loan negotiations.

B. Implementation Plan

Approximately 90-120 days should be required for the Ministry of Agriculture and CENTA to meet the initial conditions precedent following loan agreement signing. In addition to the standard conditions precedent, the following will be expected prior to initial disbursement under the loan:

1) appointment of the members of CENTA's Advisory Council by the Minister of Agriculture,
2) submission by CENTA of the completed PERT program which will serve as the implementation plan for the CENTA project and will include all construction, equipment, training and engineering services within the project.

It will be the responsibility of the new Minister of Agriculture who will take office on July 1, 1972 to appoint the members of the Advisory Council, as outlined in Part 4 Section II above. Consequently, it is likely that the members of the council will be appointed prior to loan signing.

The PERT program for CENTA is complete in format and what will be required is the final determination of specific timing phases of all the various elements in the project. This will be completed by the department heads of CENTA who prepared the PERT program during 1971 and 1972. No delay is anticipated in fulfillment of either of the conditions mentioned above.

C. Target Dates

Assuming the loan authorization by June 30, 1972, the Loan Agreement should be signed and the first Implementation Letter issued by December 1972. The initial conditions precedent should be fulfilled by March 1973. The first Letter of Commitment for training should be issued on or about August 1973 following the fulfillment of the conditions precedent regarding training programs and estimated costs. The technical assistance required for the final design plans for all facilities should be contracted as soon as possible following fulfillment of initial conditions precedent and final plans completed by August of 1973. Initial contracts on construction work should be let by December 1973 with a total of 24-27 months anticipated for the entire construction period. Equipment procurement will proceed in accordance with the anticipated completion of facilities throughout the latter part of 1973 and all of 1974.

II. Loan Implementation

A. USAID Responsibility

The USAID grant financed agricultural and management advisors to the Ministry of Agriculture and CENTA directly complement the loan program in terms of the managerial and technical needs of the Ministry and CENTA to implement the project. Technical assistance will continue to be required during the development of the CENTA program to improve all facets of its agricultural research, education and extension activities.

Monitoring of the project implementation will be the responsibility of the Rural Development Officer assisted by the Capital Development Officer, Mission Engineer and Controller. In addition to the monitoring of the construction and procurement activities, the Mission and the Ministry will periodically monitor the economic impact of the program as explained in Part 2 Section IIIB.

B. Disbursements

It is planned that all dollar costs will be disbursed under Letter of Commitment procedure. To the extent possible, the reimbursement method will be used on all local currency financing under the loan. In the case of construction contracts for the CENTA central and regional facilities, the agreed upon retention percentages will be withheld by A.I.D. pending final acceptance of the work.

On the basis of the present estimates, the disbursement period under the overall loan should run until December 1975.

C. Procurement Procedures

Selection of contractors for construction work will be carried out under competitive bidding procedures required by Salvadoran law. Salvadoran law also requires that procurement of professional engineering services be accomplished through invitation to interested firms in a manner similar to A.I.D. standard procedures. Procurement of all additional goods and services will be in conformity with standard A.I.D. operating procedures.

D. Audits

Audits will be made periodically as considered necessary by the office of the Auditor General for Latin America.

E. Additional Conditions and Covenants

1. Conditions Prior to Specific Disbursement

The Loan Agreement shall require:

a) Prior to disbursement for engineering services, CENTA will submit to A.I.D. a satisfactory contract for construction design and supervision services.

b) Prior to disbursement for technical services in economic analysis and planning, the Ministry of Agriculture will submit an implementation plan for the utilization of the technical advisors and a satisfactory scope of work.

c) Prior to disbursement for the construction of CENTA central facilities, or field units, CENTA will submit a plan and detailed schedule for all construction work and satisfactory final plans, specifications and bidding documents.

d) Prior to disbursement for personnel training, the Ministry of Agriculture and CENTA will submit a satisfactory training plan including cost estimates.

e) Prior to the procurement of vehicles under the loan the Ministry of Agriculture and CENTA will submit a plan for vehicle maintenance and replacement.

2. Covenants

In addition to the standard covenants, the Loan Agreement shall contain covenants to the effect that, unless A.I.D. otherwise agrees in writing:

a) The Ministry of Agriculture will continue to implement the Ministry-wide program of standardized salary scales and 5% annual salary increases.

b) In order to increase the efficiency of the Agricultural Extension Program the Ministry will procede to appoint a minimum number of 15 extension specialists.

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

SUBJECT: El Salvador - Capital Assistance - Agricultural Development Loan - Research, Education and Extension (CENTA)

Having taken into account, among other things, the maintenance and utilization of projects in El Salvador previously financed or assisted by the United States, I certify that in my judgement El Salvador has the financial capability and human resources to effectively utilize and maintain the proposed Agricultural Development Loan.

This judgement is based primarily on the facts developed in the Capital Assistance Paper for the proposed loan of $4.0 million, which discusses in detail the capabilities of the Centro Nacional de Tecnología Agrícola (CENTA) and finds that it will possess adequate financial and human resource capability, supported by technical assistance and training where appropriate, to effectively maintain and utilize the project. The CENTA institution is competent to implement the project and to act for the Ministry of Agriculture and the Government of El Salvador as its Executing Agency. As the Executing Agency CENTA has:

a) demonstrated its ability to carry out limited agricultural research, education, and extension using its own financial resources and resources provided by an international lending agency;
b) taken and is continuing to effectively plan and implement administrative improvement actions;
c) planned and is continuing to make arrangements for needed technical assistance and personnel training to improve the effectiveness of its operations.

J. P. Derum

J. P. Derum, Director

Date: May 23, 1972

Ministry of Agriculture & Livestock

San Salvador, May 18, 1972

SUBJECT: Loan Application for National Center of Agricultural Technology (CENTA)

Mr. Director
Agency for International Development
San Salvador

We are pleased to inform you of our Government's plans regarding the implementation of the project, "National Center for Agricultural Technology (CENTA)", an agency of the Ministry of Agriculture and Livestock, which we feel is a basic instrument for technological improvement of our national agriculture.

As you know, an understanding already exists between representatives of the Agency for International Development and the Ministry of Agriculture and Livestock, as to the need for financial assistance to the National Center for Agricultural Technology, for the purpose of expanding, improving, and coordinating the Education, Research and Extension activities for the benefit of the national agricultural economy and of the rural population, that basically depends upon or should depend upon that economy for the attainment of better standards of living. We also believe that to achieve this goal it is necessary that technical assistance through contracts and agreements with Universities and the U.S. Department of Agriculture be continued.

Background

On June 26, 1969 the Minister of Agriculture and Livestock appointed a work group composed of Ministry technicians, a representative from the private agricultural sector, and Messrs. Claude L. Horn and George W. Westcott, A.I.D. technical advisors,

to develop a project and a plan that would set guidelines for the rational and scientific execution of agricultural education, research and extension activities by consolidating different agencies that had been working separately.

In July 1970 the Work Group submitted a "Proposal for the Creation of a National Center for Agriculture Technology" that essentially contained a diagnosis of agricultural technology in El Salvador in relation to the needs for education, research and extension and the organization of a National Center for Agricultural Technology.

That same year, this document was revised and pertinent comments included.

In 1972, the Central Government, with the conviction that CENTA was a basic instrument for the development of the agricultural sector, proceeded as a preliminary phase, to the legal and budgetary integration of the three agencies of agricultural Education, Research and Extension, whose inter-relation and inter-action are indispensable for the efficient transmission of agricultural technology to the producers.

Early in 1972, a new work group was named composed of Ministry of Agriculture and Livestock and Agency for International Development personnel to carry out a more exhaustive study of the proposal for the creation of CENTA to identify specific actions and priorities for implementation of the project.

Description of the Project

As a result of the diagnosis of the Agricultural Sector, and especially of the instruments considered indispensable for agricultural development, the Government of El Salvador felt that the implementation of Project CENTA had one of the highest priorities and that it therefore was indispensable to establish required facilities, as soon as possible, for the development of applied research mainly in the areas of: basic grains, horticulture, beef cattle, dairy, spices, and soil conservation; for obtaining the means to improve educational plans and projects; and for the expansion and improvement of the Agricultural Extension service, through more extension agents, extension specialists, and new

approaches in communication methods with the small and medium farmers.

In accordance with the plans and priorities of the Government of El Salvador to integrate small and medium farmers, owners and non-owners into the economic and social development of the country, it is essential that CENTA initiate action in a systematic and dynamic manner.

Only through technology derived mainly from applied research will our agriculture attain the benefits of diversification, the necessary increases in production, generate new jobs in rural and urban sectors and in summary, generally improve the standards of living. Naturally this Government will make special efforts so that benefits of this new technology will be made available to those small and medium farmers through supporting reforms and substantial modernization in land tenure, in infrastructure and marketing agencies, in the agricultural credit system and irrigation, drainage, highways, and rural electrification infrastructure.

In order to successfully implement the project referred to, we hereby request the Agency for International Development to evaluate the possibilities of granting our Government, through the Ministries of Agriculture and Livestock, and Finance, a loan for $3,650,000 to be invested in construction (facilities), laboratory and field equipment, and vehicles.

In accordance with preliminary estimates, the loan funds and those of the Government of El Salvador will be disbursed during the five-year period (1973-1977) as shown on the following table:

(TABLE)

YEAR	Total Budget	Salaries	Administration and Operation	Others	Investment GOES	Investment A.I.D.
1973	9,305.000	3,950.000	2,520.000	210.000	900.000	1,725.000
1974	15,170.000	4,755.000	3,015.000	600.000	2,200.000	4,600.000
1975	13,700.000	5,710.000	3,590.000	300.000	1,300.000	2,800.000
1976	11,100.000	6,650.000	4,150.000	300.000	---	---
1977	12.615.000	7,655.000	4,760.000	200.000	---	---
¢	61,890.000	28,720.000	18,035.000	1,600.000	4,400.000	9,135.000
$	24,756.000	11,488.000	7,214.000	644.000	1,760.000	3,650.000

In addition to the amount requested above, this Government requests a loan of $320,000 for the following purposes: technical design and engineering supervision: $120,000; technical assistance and advisory services on agricultural projects: $100,000; academic and specialized training: $100,000.

The estimated counterpart funds which will be incurred by our Government will be provided from the annual funds allotted for Investment and Operations within the General Budget of the country.

Since one of the important constraints of Education, Research and Extension activities has been the drain and constant replacement of technical personnel due to low salaries, this Government has already initiated a gradual salary increase system and salary standardization through the different agencies of the Ministry of Agriculture and Livestock, and will continue this policy to overcome this problem in the shortest possible time.

We thank you for the attention you give to this letter, and take the opportunity to renew the assurances of our esteem and consideration.

GOD, UNION, LIBERTY

SIGNED:
Minister of Agriculture: Dr. Enrique Alvarez Córdova
Minister of Finance: Dr. Vicente Amado Gavidia Hidalgo
Secretary of National Planning Council: Ing. Salvador Jáuregui

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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.

App. - Foreign Assistance and Related Agencies Appropriations Act, 1971.

MMA - Merchant Marine Act of 1936, as amended.

COUNTRY PERFORMANCE

Progress Towards Country Goals

1. *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.

1.A(1) El Salvador is making appropriate efforts through the development of the CENTA institution for agricultural research, education and extension, the Agricultural Price Stabilization and Distribution Institute (IRA), the agricultural credit intermediaries (the Central Bank, supervised credit ABC, and GOES assisted agricultural credit cooperatives). This loan will directly lead to agricultural improvement.

(2) Creating a favorable climate for foreign and domestic private enterprise and investment.

1.A.(2) El Salvador is creating such climate by: a) investment protection laws; b) investment guaranties; c) tax incentives are provided by the Ministry of Economy on the basis of possible benefits to the "national interest"; d) Loans are available to qualifying industries from the Industrial Development Bank (INSAFI) and the Central Reserve Bank's Development Fund; e) GOES continues committed to the CACM General Treaty, is active in Normalization Commission and the president-elect has pledged to resolve the present impasse with Honduras.

(3) Increasing the public's role in the developmental process.	(3) The public's role is increasing through the expansion of Savings and Loan Associations, the private and public development banks, the expansion of credit unions and cooperative and agricultural cooperatives.
(4) (a) Allocating available budgetary resources to development.	(4) El Salvador is allocating substantial budgetary resources to development programs in education, agriculture and infrastructure projects.
(b) Diverting such resources for unnecessary military expenditure (See also Item No. 16 and intervention in affairs of other free and independent nations.) (See also Item No. 14.)	(4b) El Salvador does not appear to be taking these actions.
(5) Willing to contribute funds to the project or program.	(5) See the Financial Section of the Paper (Part 2) for a discussion of El Salvador's contribution.
(6) 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.	(6) The new administration of President Molina will probably continue the moderately reformist policies of the previous government and may undertake additional social and economic reforms.

(7) Adhering to the principles of the Act of Bogota and Charter of Punta del Este.	(7) El Salvador is adhering to the principles of the Act of Bogotá and the Charter of Punta del Este.
(8) Attempting to repatriate capital invested in other countries by its own citizens.	(8) El Salvador has consistently followed policies that encourage the repatriation of capital invested in other countries by its citizens.
(9) Otherwise responding to the vital economic, political, and social concerns of its people, and demonstrating a clear determination to take effective self-help measures.	(9) El Salvador is responding to these concerns and demonstrating a clear determination to take effective self-help measures as shown by its increase in tax revenues and contributions from its own resources for agricultural reform, educational reform and other development projects.
B. Are above factors taken into account in the furnishing of the subject assistance?	B. The above factors have been taken into account in furnishing of the subject assistance.

Treatment of U.S. Citizens

2. *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?*	2. El Salvador is not known to be so indebted. However, negotiations continue between the GOES and the IRCA, a U.S. owned railway company, on the future of the firm. (see No. 3 below).

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3. *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?*	3. The GOES has "intervened" the IRCA (U.S. owned railroad) in order to supervise the financial transactions of the Company, which is running on a very short budget. The GOES' Committee in charge of the intervention has stressed its commitment not to expropriate, nationalize or control IRCA, which, in any case, reverts to El Salvador within 20 years.
4. *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,*	4. No case of seizure, penalty or sanction against U.S. fishing vessels is known to exist, even though El Salvador claims 200 mile territorial sea.
a. has any deduction required by Fishermen's Protective Act been made?	4.a. Not applicable
b. has complete denial of assistance been considered by A.I.D. Administrator?	4.b. Not applicable.

Relations with U.S. Government and Other Nations

5. *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?*

5. Not applicable.

6. *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?*

6. El Salvador has not permitted such acts.

7. *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?*

7. A bilateral agreement between the United States and El Salvador relating to the guaranty of private investments, was signed in San Salvador January 20, 1960 and entered into force April 5, 1960. El Salvador has actively instituted the guaranty program.

8. *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?*

8. No such default exists.

9. *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?*

9. El Salvador has consistently maintained diplomatic relations with the United States.

10. *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?*

10. El Salvador is not known to be delinquent on any of its U.N. obligations.

11. *FAA § 620(a). Does recipient country furnish assistance to Cuba or fail to take appropriate steps to prevent ships or aircraft under its flag from carrying cargoes to or from Cuba?*

11. According to the best information available, El Salvador complies fully with these prohibitions against trade with or assistance to the present government of Cuba and with permitting ships or aircraft under its registry to carry proscribed items to Cuba.

12. *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?*

12. The Secretary of State has determined that El Salvador is not controlled by the Communist movement.

13. *FAA § 620(f). Is recipient country a Communist country?*

13. No.

14. *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?*

14. No.

15. *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?*

15. El Salvador does not traffic or knowingly permit trafficking with North Viet Nam.

Military Expenditures

16. *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).)*

16. Expenditures for military purposes represent approximately 5.95% of total government expenditure and its public safety budget (Nat. Guard, Nat. Police, Fire Dept. etc.) represents 3.2% of its National Budget or a total of 9.15% of GNP for the two items. El Salvador's foreign exchange disbursements for military equipment are projected to be less than $300,000 per FY. The GOES has not purchased sophisticated military equipment during the current U.S. fiscal year. No determination has been made that the GOES is devoting to military purposes a percentage of resources which materially interferes with its development.

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CONDITIONS OF THE LOAN

General Soundness

17. *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.*	17. The terms of the proposed loan are legal under both U.S. and Salvadoran laws, and are considered reasonable.
18. *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?*	18. The activity is considered economically and technically sound. See Technical and Financial Analysis Part 4, II and VI. USAID/El Salvador has received an application for this loan project and it is attached as Exhibit B of Annex I. Assurances have been given by the GOES, Ministry of Agriculture that the funds will be used in an economically and technically sound manner.
19. *FAA § 251(b). Information and conclusion on capacity of the country to repay the loan, including reasonableness of repayment prospects.*	19. El Salvador is considered able to repay the proposed loan.
20. *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?*	20. A reasonably firm estimate of the cost to the U.S. of the proposed assistance has been made. See Part 4 Sections II & VI and Annex V for the Engineering and Financial Plans.

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21. *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 purposes of loan?*	21) Additional legislation is not required.
22. *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?*	22) Yes. See Director's Certification in Annex I, Exhibit A.
23. *FAA § 251(b). Information and conclusion on availability of financing from other free-world sources, including private sources within the United States.*	23) As discussed in Part 2, Section IIF, IBRD, IDB and EX-IM have all expressed no interest in financing this project. Since concessional lending terms are required for the project, other sources are not known to exist.
Loan's Relationship to Achievement of Country and Regional Goals	
24. *FAA § 207; § 251(a). 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, or*	24)(a) The proposed project is intended to strengthen the national institution responsible for agricultural research, and training and to expand and improve the national agricultural extension service. b) The primary purpose of the project is to assist the GOES to carry out its program to meet its food needs. (c) The proposed project will expand the national agricultural school and assist in the improvement of curriculum and facilities at the school so as to expand the availability of trained manpower for extension and other related agricultural work. d) By supporting the research and development of diversified agricultural produce (specifically fruits, vegetables and beans) and helping farmers produce these crops economically, the project should substantially contribute to improved diet.

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24. *(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.*	24.e) Other aspects of economic, social and political development expected to result from the program are discussed in Part 2, Section II and Part 3 Section II.
25. *FAA § 209. Is project susceptible of execution as part of regional project? If so why is project not so executed?*	25) The project does not relate directly to regional activities.
26. *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.*	26) This activity has a basic significance for all of the Borrower's development activities and will play an essential part in the realization of long range objectives in agriculture as discussed in Part 2, Section II. 1 (GOES Sector Strategy)
27. *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.*	27) The program will contribute to El Salvador's self sustaining growth by providing the most essential basis (research education and extension) to continued development of the agricultural sector.
28. *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*	28) The project contributes indirectly to these objectives through the expansion and improvement of the GOES agricultural extension service which assists farmers in the establishment of production and marketing cooperatives and farmers associations including 4-H groups.

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29. *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.*	29. The project is designed to address the priority research needs of small and medium sized producers and to assist in the development, through short and long term training, the human resources necessary for the continuing tasks of research, education, and extension.
30. *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.*	30. The loan will directly support the efforts of the country to assist small and medium sized producers, as well as, rural cooperatives (production and marketing) in the development of non-traditional agricultural products and in the improvement of the technical efficiency of agriculture.
31. *FAA § 619. If assistance is for newly independent country; is it furnished through multilateral organizations or plans to the maximum extent appropriate?*	31. El Salvador is not a newly independent country.
32. *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.*	32. The loan is consistent with the findings and the recommendations of the Inter American Committee for the Alliance for Progress in its latest annual review. See Part 2, Section IV.

33. *FAA § 251(g). Information and conclusion on use of loan to assist in promoting the cooperative movement in Latin America.*

33. The Project is not specifically intended to promote the cooperative movement but some indirect assistance may follow as the program supports the GOES rural extension services which activity promote and assist rural production and marketing cooperatives.

34. *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.*

34. This project does not relate directly to regional activities.

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

35. *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.*

35. This project will have no adverse effect on the U.S. economy. A substantial portion of the laboratory equipment and field equipment to be procured under the loan will be procured from the U.S.

36. *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).*

36. The loan will finance the procurement of some goods from U.S. private sources, thereby encouraging private U.S. participation.

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37. *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?*	37. **This will be complied with.**
38. *FAA § 602. Information and conclusion whether U.S. small business will participate equitably in the furnishing of goods and services financed by the loan.*	38. **To the extent possible, small business notification in accordance with A.I.D. procedure will be complied with.**
39. *FAA § 620(h). Will the loan promote or assist the foreign aid projects or activities of the Communist-Bloc countries?*	39. **No assistance under the Loan will promote any project or activity of a Communist-Bloc country.**
40. *FAA § 621. If Technical Assistance is financed by the loan, information and conclusion whether such assistance will be furnished to the fullest extent practicable as goods and professional and other services from private enterprise on a contract basis. If the facilities of other Federal agencies will be utilized, information and conclusion on whether they are particularly suitable, are not competitive with private enterprise, and can be made available without undue interference with domestic programs.*	40. **Technical assistance provided under the loan to the fullest extent practicable will utilize goods and professional services from private enterprise on a contractual basis.** **It is not anticipated that loan funds will finance the use of other Federal agencies.**

41. *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.*

41. **The entire loan will be so used.**

Loan's Compliance with Specific Requirements

42. *FAA § 201(d). Is interest rate of loan at least 2% per annum during grace period and at least 3% per annum thereafter?*

42. **Yes.**

43. *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.*

43. **The loan agreement will so provide.**

44. *FAA § 604(a). Will all commodity procurement financed under the loan be from the United States except as otherwise determined by the President?*

44. **Yes.**

45. *FAA § 604(b). What provision is made to prevent financing commodity procurement in bulk at prices higher than adjusted U.S. market price?*

45. **No bulk commodity purchases are contemplated.**

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46. *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?*	46. **Yes.**
47. *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?*	47. **Not applicable.**
48. *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?*	48. **Not applicable.**
49. *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?*	49. To the **maximum extent** practicable, contracts **for construction** services will be let **on a competitive** basis.
50. *FAA § 620(g). What provision is there against use of subject assistance to compensate owners for expropriated or nationalized property?*	50. **The loan agreement** will not **permit such use.**

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51. *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.*	51. As reflected in the financial plan, maximum feasible local contributions are being obtained. No excess foreign currency is available.
52. *App. § 104. Will any loan funds be used to pay pensions, etc., for military personnel?*	52. No.
53. *App. § 106. If loan is for capital project, is there provision for A.I.D. approval of all contractors and contract terms?*	53. The loan agreement will so provide.
54. *App. § 108. Will any loan funds be used to pay U.N. assessments?*	54. No.
55. *App. § 109. Compliance with regulations on employment of U.S. and local personnel for funds obligated after April 30, 1964 (A.I.D. Regulation 7).*	55. This will be complied with.
56. *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?*	56. No non-US vehicles will be procured.

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57. *App. § 401. Will any loan funds be used for publicity or propaganda purposes with the United States not authorized by the Congress?*

57. No.

58. *FAA § 620(k). If construction of productive enterprise, will aggregate value of assistance to be furnished by the United States exceed $100 million?*

58. No.

59. *FAA § 612(d). Does the United States own excess foreign currency and, if so, what arrangements have been made for its release?*

59. No.

60. *MMA § 901.b. 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.*

60. Compliance will be observed to the extent that such vessels are available at fair and reasonable rates.

61. 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?

61. The government has taken such measures as are within its capacity to control narcotics traffic and is cooperating with U.S. efforts to eliminate production and trade in narcotics.

CENTA
SUMMARY PLAN

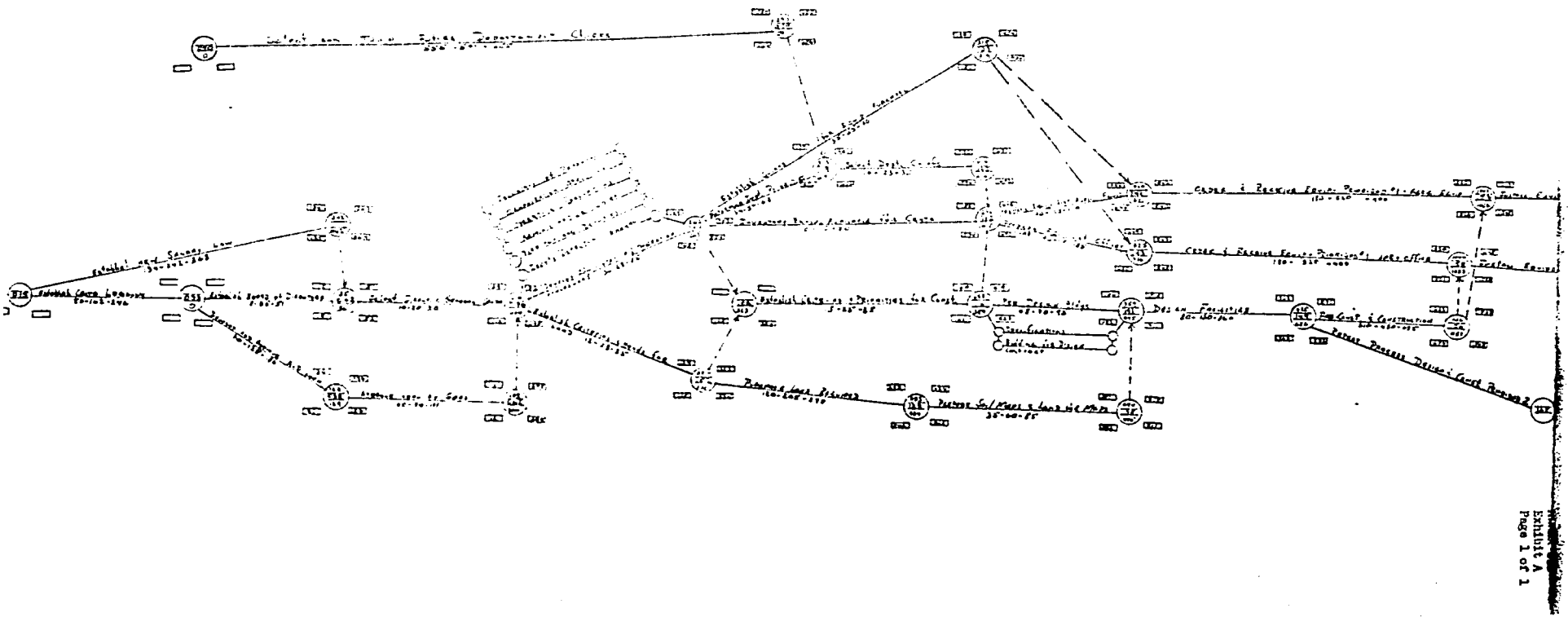

Exhibit A
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BIO-DATA

Name: EUGENIO SALAZAR BENEKE
Present Position: Director General of CENTA
Age: 49
Degree: Ingeniero Agronomo (1948)
Special Courses: Special graduate course in Poultry
Positions held:

In the Ministry of Agriculture:

Head of Forestry Section
Head of Coffee Section
Sub-Director of Livestock
Director General of Livestock
Director General of Agricultural Research
Director General of Agricultural Research and Extension
Director General of CENTA

In Guatemala:

Head, Department of Animal Sciences of the National Agricultural Institute.

BIO-DATA

Name: ARMANDO ALAS LOPEZ
Present Position: Director of Research, CENTA
Age: 45
Degree: Ingeniero Agronomo
Special Courses:

1. Plant diseases, Univ. of California, Berkeley, 1961-62
2. Public Administration in Agricultural Development, Univ. of Wisconsin, 1968
3. Seminar in Communications, Michigan State Univ. 1968

Positions held:

Head, Plant Pathology Section DGIA
Director, School of Ingeniería Agronómica, Univ. de El Salvador
Secretary, Faculty of Agronomic Sciences, Univ. de El Salvador.
Subdirector General of Agricultural Research DGIA
Director of Agricultural Research, CENTA

BIO-DATA

Name:	Carlos Francisco BURGOS
Present Position:	Director, ENA (National Agricultural School)
Age:	35
Degrees:	B.S. (Soils and Crops), Univ. of Florida M.S. (Soils and Statistics), Univ. of Florida Ph. D. (Soils and Plant Physiology), Univ. of Florida, 1967.

Positions held:

Professor of Soil Chemistry, Panamerican Agricultural School, Honduras

Associate Agronomist, Tela Railroad Co. La Seina, Cortés Honduras

Sub-director and head of teaching, ENA

Director, ENA

BIO-DATA

Name:	Jose Perez Guerra
Present Position:	Director of Extension, CENTA
Age:	46
Degree:	Agronomist
Special Courses:	Extension, Rural Sociology, Applied Nutrition, Supervision

Positions Held:

Extension Agent
Supervisor
Supervisor 4-C Clubs
Sub-Director of Extension
Director of Extension

22 years of experience in agricultural extension.

GOES Contributions to Agricultural Research, Extension, Education and Livestock

(In colones: 2.50 = $1.00)

	A C T U A L						Budget CY-1972 (1)
	CY-1966	CY-1967	CY-1968	CY-1969	CY-1970	CY-1971	
Extension Division	840,9[illegible]5	944,293	2,447,064	2,254,462	2,592,792	2,992,775	3,636,650 (3)
Administration (2)	236,4[illegible]	248,069	28[illegible],237	362,821	547,288	742,215 (	3,451,680
Program	570,058	639,259	1,820,467	1,393,476	1,397,116	1,561,653 (	
Equipment	34,389	56,965	67,871	[illegible],125	118,892	115,867	169,970
Investment	-	-	276,089	413,040	529,496	573,040	15,000
Research Division (4)	1,070,940	1,087,538	Combined w/Extension (5)	Combined w/Ext.	Combined w/Ext.	Combined w/Ext.	Combined w/Ext.
Administration	310,50[illegible]	324,873					
Program	68[illegible],55[illegible]	748,996					
Equipment	76,[illegible]72	1[illegible],669					
ISIC (Coffee Research) own funds	59,500	46,600	45,000	30,740	75,000	75,240	65,720
" " " Min. Ag. funds	422,919	553,500	553,500	653,338	679,088	765,440	110,000
Education Division (ENA)	543,77[illegible]	5[illegible],651	658,764	684,429	687,194	721,908	Combined w/Ext.
Administration	222,69[illegible]	256,8[illegible]3	281,907	285,410	277,462	268,796	
Program	258,099	324,17[illegible]	366,494	390,322	401,193	444,425	
Equipment	3,275	5,639	10,363	6,697	8,539	3,487	
Investment	59,712	-	-	-	-	7,200	1,217,010 (6)
MEGA - Livestock Improvement	1,1[illegible],859	218,066	227,347	162,223	208,319	208,332	235,000
Livestock Division	868,554	879,046	911,073	869,927	812,895	1,059,274	1,213,510
Administration	162,554	203,032	206,431	193,733	317,216	290,596 (	
Program	699,792	649,942	678,571	659,863	485,060	696,358 (	1,138,510
Equipment	6,208	26,072	26,071	16,331	10,619	40,602	75,000
Investment	-	-	-	-	-	31,718	
TOTALS	₡5,006,485	₡4,316,694	₡4,843,348	₡4,665,119	₡5,055,288	₡5,822,969	₡6,477,890

(1) As originally approved. In addition ₡200,000 allocated in May from GOES ₡23.0 million bond issue for cotton and beans research.
(2) Administration includes salaries overhead central office; Program includes salaries, overhead field offices.
(3) CENTA - National Center of Agricultural Technology established in 1972 combined Research, Extension and Education Divisions of Min. Ag.
(4) Research includes cotton and beans research CY-1968 ₡[illegible],229; CY-1969 ₡471,969; CY-1970 ₡533,474; CY-1971 ₡592,102 and Budget CY-1972 ₡300,010.
(5) In 1968 the Extension and Research Agencies were merged.
(6) This is for capital investment, loan from BIRF ₡76[illegible],000 programmed for CY 1971, ₡457,010 for CY-1972 not yet expended. (IBRD).

RAV:GR

ANNEX III
EXHIBIT D
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CENTRAL GOVERNMENT AND AUTONOMOUS AGENCIES

CONTRIBUTIONS TO AGRICULTURAL SECTOR

(IN COLONES: ₡2.50 = $1.00)

	ACTUAL						BUDGET
	CY-1966	CY-1967	CY-1968	CY-1969	CY-1970	CY-1971	CY-1972
SPECIAL BUDGET – AUTONOMOUS 1/ AGENCIES (THEIR OWN FUNDS)	55,753,279	56,746,621	66,735,569	65,081,584	72,395,485	113,887,845	141,479,820
ISIC-COFFEE RESEARCH	59,500	46,600	45,000	30,740	75,000	75,240	65,720
ICR-RURAL DEVELOPMENT	656,700	630,700	560,260	726,150	1,048,110	1,073,080	1,920,010
CATTLEMEN'S ASS'N	25,900	25,900	25,900	12,400	–	36,970	94,800
IRA-GRAIN PRICE REGULATION	431,696	221,696	221,696	1,300,002	710,005	709,970	12,350,030
ABC-SMALL FARMER'S BANK	663,130	796,713	1,524,962	1,161,114	1,164,046	1,345,494	2,013,300
UNIVERSITY AGRICULTURE DEPT.	294,000	433,000	557,000	611,000	680,000	878,580	894,755
TOTAL AGRICULTURAL INSTITUTIONS	2,130,926	2,154,609	2,934,818	3,841,406	3,677,161	4,119,334	17,338,615
*MINISTRY OF AGRICULTURE EXPENDITURES	17,725,645	12,566,985	11,069,200	12,093,300	14,542,650	17,987,200	18,919,200
RESEARCH & EXTENSION	1,911,875	2,031,831	2,447,664	2,254,462	2,592,792	2,992,775	2/
AGRICULTURAL ECONOMICS(MARKETING & PLANNING (CONSERVATION	240,717	240,095	269,079	428,907	486,070	529,471	587,050
ENA-AGRICULTURAL SCHOOL	–	–	152,915	152,465	175,759	203,806	225,530
COTTON & BEANS RESEARCH	543,778	589,651	658,764	684,429	687,194	721,908	2/
META-LAND IMPROVEMENT	–	–	344,229	471,969	533,474	592,102	300,010
MEGA-CATTLE IMPROVEMENT	302,682	269,696	242,081	92,068	137,460	143,514	165,000
MEPO-HOG IMPROVEMENT	1,199,859	218,066	227,347	162,223	208,319	208,332	235,000
ISIC-COFFEE RESEARCH	198,253	173,416	148,036	85,144	94,795	109,501	115,000
ICR-RURAL DEVELOPMENT	422,919	553,500	553,500	663,338	679,088	765,440	110,000
CATTLEMEN'S ASSOCIATION	1,976,900	2,576,900	2,176,900	2,276,900	2,621,900	3,495,079	3,876,950
ABC-SMALL FARMER'S BANK	94,500	94,500	94,500	92,826	–	–	–
CENTA 2/	5,707,402	1,272,469	500,000	1,000,000	1,000,000	1,000,000	10
ZAPOTITAN PROJECT	–	–	–	–	–	–	3,636,650
LIVESTOCK DIVISION	521,877	1,066,102	519,760	605,946	2,061,261	2,734,927	1,945,610
OTHER AGENCIES	868,554	579,046	911,073	869,927	812,895	1,059,274	1,213,510
#TOTAL AUTONOMOUS AGENCIES 1/ & MINISTRY OF AGRICULTURE	3,636,329	2,601,893	1,823,322	2,252,696	2,449,643	3,431,071	6,508,870
*CENTRAL GOVERNMENT EXPENDITURES	19,856,571	14,721,594	14,004,018	15,934,706	18,219,811	22,106,534	36,257,815
*PERCENTAGE MINISTRY TO CENTRAL GOVERNMENT	244,678,954	226,433,556	221,958,789	247,222,412	269,520,514	294,545,637	338,341,000
#CENTRAL GOVERNMENT & AUTONOMOUS AGENCIES EXPENDITURES 1/	7.2	5.5	5.0	4.9	5.4	6.1	5.6
#PERCENTAGE ALL AGRICULTURE EXPENDITURE TO TOTAL	300,432,233	283,160,177	288,694,358	312,303,996	341,915,999	408,433,482	479,820,820
	6.6	5.2	4.8	5.1	5.3	5.4	7.6

1/ BUDGETED FIGURES USED, DUE TO LACK OF PUBLISHED ACTUAL EXPENDITURES.

2/ CENTA – NATIONAL CENTER OF AGRICULTURAL TECHNOLOGY ESTABLISHED IN 1972, COMBINED RESEARCH, EXTENSION AND EDUCATION DIVISIONS OF THE MINISTRY OF AGRICULTURE

SOURCE: / BUDGETS OF AUTONOMOUS AGENCIES AND CENTRAL GOVERNMENT ALSO BUDGET LIQUIDATIONS BY MINISTRY OF FINANCE.

RAV:GR

DISTRIBUTION OF TECHNICAL RESEARCH PERSONNEL BY DEPARTMENT AND BY YEAR

Departments	1971		1972		1973		1974		1975		1976		1977	
	P	A	P	A	P	A	P	A	P	A	P	A	P	A
Agronomy	10	12	10	12	17	15	21	17	27	22	29	23	35	27
Soils	8	4	8	4	9	4	9	4	10	4	10	4	11	5
Animal Science	-	-	-	-	7	7	10	7	14	8	16	9	17	9
Agricultural Engineering	-	-	-	-	3	3	5	5	7	7	7	7	8	7
Agricultural Economics	-	-	-	-	2	2	2	2	4	3	4	3	4	3
Plant Parasitology	10	6	10	6	11	6	11	7	12	8	13	8	13	8
Agricultural Chemistry	12	8	12	9	12	9	14	10	14	10	15	10	15	10
Agricultural Education and Social Science	-	-	-	-	3	3	5	3	6	3	7	4	7	4
Total of Personnel	40	30	40	31	64	49	77	55	94	65	101	68	110	73
Increase in Personnel	-	-	-	1	24	18	13	6	17	10	7	3	9	5

P = Professional Researchers

A = Research Assistants

ANNEX III
EXHIBIT E
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SUMMARY OF TECHNICAL RESEARCH PERSONNEL AND SALARIES 1973 TO 1977

Classification	1973 No.	a) Monthly per person b) Monthly Total	1974 No.	a) Monthly per person b) Monthly Total	1975 No.	a) Monthly per person b) Monthly Total	1976 No.	a) Monthly per person b) Monthly Total	1977 No.	a) Monthly per person b) Monthly Total	Total Cost in 5 years
Director of Research	1	a) 1,600 b) 1,600	1	a) 1,680 b) 1,680	1	a) 1,764 b) 1,764	1	a) 1,852 b) 1,852	1	a) 1,944 b) 1,944	
Annual Cost		19,200		20,160		21,168		22,224		23,328	106,080
Sub-Director of Research	1	a) 1,500 b) 1,500	1	a) 1,575 b) 1,575	1	a) 1,653 b) 1,653	1	a) 1,735 b) 1,735	1	a) 1,821 b) 1,821	
Annual Cost		18,000		18,900		19,836		20,820		21,852	99,408
Professional Researcher Head of Department	8	a) 1,300 b) 10,400	8	a) 1,365 b) 10,920	8	a) 1,433 b) 11,464	8	a) 1,504 b) 12,032	8	a) 1,579 b) 12,632	
Annual Cost		124,800		131,040		137,568		144,384		151,584	689,376
Associate Researcher	11	a) 1,200 b) 13,200	11	a) 1,260 b) 13,860	11	a) 1,323 b) 14,553	11	a) 1,389 b) 15,279	11	a) 1,458 b) 16,038	
Annual Cost		158,400		166,320		174,636		183,348		192,456	875,160
Assistant Researcher	53	a) 1,000 b) 53,000	66	a) 1,050 b) 69,300	83	a) 1,102 b) 91,466	90	a) 1,157 b) 104,130	99	a) 1,214 b) 120,186	
Annual Cost		636,000		831,600		1,097,592		1,249,560		1,442,232	5,256,984
Research Assistant 3	10	a) 500 b) 5,000	10	a) 525 b) 5,250	12	a) 551 b) 6,612	12	a) 578 b) 6,936	13	a) 606 b) 7,878	
Annual Cost		60,000		63,000		79,344		83,232		94,536	380,112

SUMMARY OF TECHNICAL RESEARCH PERSONNEL AND SALARIES 1973 to 1977 (CONT'D.)

Classification	1973 No.	a) Monthly per person b) Monthly Total	1974 No.	a) Monthly per person b) Monthly Total	1975 No.	a) Monthly per person b) Monthly Total	1976 No.	a) Monthly per person b) Monthly Total	1977 No.	a) Monthly per person b) Monthly Total	Total Cost in 5 years
Research Assistant 2	19	a) 400 b) 7,600	20	a) 420 b) 8,400	23	a) 441 b) 10,143	23	a) 463 b) 10,649	25	a) 486 b) 12,150	
Annual Cost		91,200		100,800		121,716		127,788		145,800	587,304
Research Assistant 1	20	a) 300 b) 6,000	25	a) 315 b) 7,875	30	a) 330 b) 9,900	33	a) 346 b) 11,418	35	a) 363 b) 12,705	
Annual Cost		72,000		94,500		118,800		137,016		152,460	574,776
Total Cost		1,179,600		1,426,320		1,770,660		1,968,372		2,224,248	8,569,200
Annual Increase		328,860 1/		225,660		358,200		197,712		255,876	

1/ Increase over the 1972 budget of ¢850,740 which indludes research, seed multiplication and buildings and equipment.

ESTIMATED NUMBERS AND MAN MONTHS OF FELLOWSHIPS TO FOREIGN INSTITUTIONS IN THE FIVE YEAR PERIOD

Crop Science	1973	1974	1975	1976	1977
Horticulture	2/12	3/12	1/12	1/6	--
Herbs & Spices	1/12	--	--	1/12	--
Cereals	2/12	--	1/6	2/12	1/12
Beans	--	--	2/12	--	--
Fibers	1/8	--	--	1/12	--
Pastures & Forages	--	1/18	--	--	--
Crop Ecology	--	--	--	--	1/12
Animal Science					
Fish Culture	1/12	--	--	--	3/12
Milk Production	1/8	--	--	1/6	--
Beef Production	--	1/12	--	--	--
Dairy Records	--	2/6	--	--	--
Swine Production	1/6	--	1/12	--	--
Poultry	1/12	--	--	1/12	1/6
Apiculture	1/6	--	--	--	1/6
Agricultural Chemistry					
Bromatological Analysis	--	--	2/12	--	--
Residue Analysis	--	2/6	--	1/12	--
Plant Protection					
Fungus diseases	--	2/6	--	1/12	--
Virology	1/24	--	--	--	2/3
Nematology	--	--	1/12	--	--
Entomology	--	1/12	--	--	1/18
Soils					
Soil Fertility	1/12	--	--	2/6	--
Soil Mapping	--	--	1/12	--	--
Agr. Economics					
Marketing	1/12	--	--	--	1/6
Farm Management	--	--	1/12	--	--
Agr. Engineering					
Nat'l Res.Conservation	1/18	--	1/12	1/6	--
Agro Industries	1/12	--	2/12	1/6	--
Machinery	1/12	--	--	--	1/6
Irrigation	1/12	--	--	1/8	--
Rural Construction	--	--	1/6	--	1/8

TECHNICAL ASSISTANCE FOR FARMERS
(1973-1977)

Item	1972		1973		1974		1975		1976		1977	
	Farmers	Has.	Farmers	Has.	Farmers	Has.	Farmers	Has.	Farmers	Has.	Farmers	Has.
Corn	5,265	2,751	6,844	4,500	7,528	7,000	9,033	10,000	11,473	18,000	17,614	25,000
Beans	2,220	2,700	2,886	4,000	3,175	5,500	3,810	7,500	4,953	10,000	5,429	12,000
Rice	533	1,479	693	2,000	762	3,500	914	5,000	1,188	7,000	1,782	9,000
Sorghum	612	2,000	796	3,500	876	5,000	1,051	6,500	1,366	8,500	2,049	11,000
Fruit	358	186	465	250	512	500	614	1,000	796	2,000	1,197	3,000
Vegetables	535	266	695	600	765	1,000	930	1,800	1,209	2,700	1,813	4,000
Soil Conservation	2,634	2,597	3,424	4,000	3,766	6,000	4,259	9,500	5,537	10,000	8,320	12,000
Livestock (pastures)	180	1,750	300	2,500	400	3,500	600	6,000	750	7,000	900	8,000
Others	100	24,285	125	26,428	150	29,143	180	32,000	200	35,214	250	38,786
TOTAL	12,437	38,014	16,228	47,778	17,934	61,143	21,391	78,300	28,042	100,414	39,854	122,786

MONTHLY SALARIES OF THE EXTENSION SERVICE
1973 - 1977

POSITION	1973	1974	1975	1976	1977
Director	1,500.00	1,575.00	1,654.00	1,736.00	1,823.00
Sub-Director	1,300.00	1,365.00	1,433.00	1,505.00	1,580.00
Section Chiefs	1,150.00	1,207.00	1,268.00	1,331.00	1,398.00
Specialists	1,000.00	1,050.00	1,102.00	1,158.00	1,215.00
Regional Supervisors	840.00	882.00	926.00	972.00	1,021.00
Zone Super.	780.00	819.00	860.00	903.00	948.00
Chief Agents	700.00	735.00	772.00	810.00	851.00
Asst.Agents	450.00	472.00	496.00	520.00	547.00
Home Demonstration Agents	450.00	472.00	496.00	520.00	547.00

Annex III
Exhibit I
Page 1 of 1

CROP YIELDS IN CENTRAL AMERICA
(Metric Tons per Hectare)

CROP	Average 61-65	1966	1967	1968	1969	1970
Corn						
Guatemala	0.85	0.91	0.97	1.01	1.03	1.01
El Salvador	1.08	1.28	1.09	1.29	1.29	1.35
Honduras	0.79	0.91	0.91	0.97	0.92	0.94
Nicaragua	1.06	0.87	0.89	0.89	0.87	0.83
Costa Rica	1.01	1.09	1.14	1.06	1.03	0.95
Sorghum						
Guatemala	0.64	0.84	0.53	0.77	1.12	1.10
El Salvador	1.02	1.07	1.04	1.09	0.95	1.00
Honduras	0.80	0.75	0.89	0.97	1.06	1.06
Nicaragua	0.94	1.02	1.04	1.09	1.09	1.09
Costa Rica	--	--	--	--	--	--
Rice						
Guatemala	1.45	1.71	2.05	1.85	1.90	2.00
El Salvador	2.34	2.56	2.78	2.92	2.86	3.00
Honduras	1.65	1.75	1.47	1.78	1.67	1.78
Nicaragua	1.45	2.32	2.47	2.69	2.85	2.59
Costa Rica	1.32	1.68	2.76	3.09	2.36	2.36
Beans						
Guatemala	0.63	0.69	0.65	0.61	0.62	0.62
El Salvador	0.57	0.59	0.62	0.67	0.74	0.92
Honduras	0.44	0.70	0.40	0.45	0.50	0.48
Nicaragua	0.72	0.66	0.73	0.72	0.69	0.68
Costa Rica	0.38	0.51	0.41	0.49	0.43	0.50

Source: Production Yearbook 1970. Vol. 24 - FAO Rome
Current to Feb. 1, 1971.

IMPACT OF DIRECT SERVICE BY EXTENSION ON CROP YIELD

Crop Year	Assisted		National	
	Area Ha.	Yield Metric tons per Hectare	Area Ha.	Yield Metric tons per Hectare
1967				
Corn	5,941	2.64	191,675	1.09
Sorghum	407	2.15	103,776	1.04
Beans	393	0.87	28,388	0.62
Rice	2,220	3.44	27,972	1.81
1968				
Corn	3,575	2.73	199,545	1.29
Sorghum	569	2.29	113,636	1.09
Beans	338	0.96	31,657	0.67
Rice	2,329	4.12	27,278	1.90
1969				
Corn	5,210	2.80	193,916	1.44
Sorghum	--	--	113,689	1.13
Beans	3,761	0.88	33,843	0.78
Rice	637	3.15	20,699	2.17
1970				
Corn	8,625	2.90	205,734	1.77
Sorghum	1,151	1.27	124,056	1.19
Beans	9,609	1.07	36,843	0.83
Rice	780	3.52	11,888	2.42

Source: Informe Anual de Labores 1970/1971
Ministerio de Agricultura y Ganadería

NATIONAL AGRICULTURAL SCHOOL - ENROLLMENT

YEARS 1956 - 1971

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
First Year																	
Matriculation	70	63	65	45	56	53	47	57	82	69	101	117	69	90	104	101	100
Successful completion	70	56	47	35	43	31	27	42	53	55	88	112	63	65	71	71	--
Second Year																	
Matriculation	--	56	44	47	35	43	31	27	42	53	55	88	112	63	65	72	73
Successful completion	--	42	40	43	34	38	32	25	39	51	45	81	101	62	60	70	--
Third Year																	
Matriculation	--	--	42	40	43	34	38	32	25	39	51	45	81	89	62	60	70
Graduates	--	--	42	40	42	34	38	32	25	39	52	44	81	89	62	59	--
Graduates	--	--	--	42	40	42	34	70	25	39	52	44	81	89	62	59	--
Total Graduates	--	--	--	42	82	124	158	228	253	292	344	388	469	558	620	679	--
Total Matriculation	70	119	151	132	134	130	116	116	149	161	207	250	262	242	231	232	

UNCLASSIFIED
ANNEX III
EXHIBIT 1
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INCREASE IN PERSONNEL ACCORDING TO PROJECTED ENROLLMENT

	At Present	1973	1974	1975	1976	1977	TOTAL
Professors	28	2	2	2	1	-	7
Instructors	14	3	3	3	2	-	11
Secretaries	4	-	1	1	-	-	2
Administrative office	6	1	1	-	1	-	3
Clinic	4	-	1	1	-	-	2
Kitchen	12	2	2	2	2	-	8
Laundry	12	1	1	1	1	-	4
Cleaning	8	2	2	2	2	-	8
Maintenance	42	2	1	2	2	-	7
Student enrollment		310	374	473	479	478	

LEVEL OF TRAINING OF TEACHING PERSONNEL, ENA

	1969		1971	
Academic Grade	Number	Percent	Number	Percent
Ph. D.	0	0	1	4%
Masters	1	4%	2	7%
B.S.	9	33%	17	60%
Agronomist (Lacking Thesis)	7	26%	3	11%
Others	10	37%	5	18%
	27		28	

EXISTING BUILDINGS AT ENA

1. Auditorium for 450 persons, also utilized as dining room
2. Four student dormitories
3. Classroom building with: six classrooms for 40 students, an office for professors, one large classroom for 100 students (will be new library), small room for present library.
4. Administration building
5. Kitchen and laundry building
6. Medical and dental clinic
7. Farm shop
8. Mainteuance shop
9. Food processing plant
10. Small apartment building for six single professors
11. 10 houses for professors
12. 3 houses for instructors
13. Various livestock buildings for : dairy, beef, swine, poultry, rabbits and several small facilities for workers.

Constructions Year 1971	No.	IBRD Percent 20%	GOES Percent 80%	TOTAL
Feedlot for Beef	1	¢ 3,563.36	¢ 14,253.36	¢ 17,816.82
Swine Unit	1	3,823.51	15,294.04	19,117.55
Agronomy warehouse	2	5,282.66	21,130.64	26,413.30
Machine shed	1	4,250.55	17,002.20	21,252.75
Farm Shop	1	10,198.10	40,792.40	50,990.50
Greenhouse	1	3,647.53	14,590.12	18,237.65
Silos	2	3,675.88	14,703.55	18,379.43
Milking Parlor	1	1,904.66	7,618.66	9,523.32
Dairy Processing Plant	1	14,774.10	59,096.40	73,870.50
Dormitories for 1st yr. students	2	55,591.49	222,365.96	277,957.45
Estimated costs (1966)		106,711.84	426,847.43	533,559.27
*Actual costs from bidding (1971)		¢128,824.46	¢515,297.86	¢ 644,122.32

The buildings remaining to be bid are:

IBRD Loan Year 1972

Dormitories for third year Students	2	89,232.00	356,928.00	446,160.00
Laboratories (Physics, Chemistry and Biology)	1	56,760.00	227,040.00	283,800.00
Water tank	1	12,000.00	48,000.00	60,000.00
Estimated costs ENA		¢157,992.00	¢631,968.00	¢ 789,960.00

*¢ 110,563.05 is the difference between ENA estimated costs and actual bidding costs (real costs)

ANNEX III
EXHIBIT Q
Page 1 of 1

NUMBER OF ENA GRADUATES WORKING IN VARIOUS PUBLIC AND PRIVATE ORGANIZATIONS, 1968-1972

	1968	1969	1970	1971	1972
1. Centro Nacional de Tecnología Agropecuaria (CENTA)	107	107	107	144	144
2. Dirección General de Ganadería	12	12	22	22	22
3. Dirección General de Economía Agrícola y Planificación	4	3	4	14	14
4. Dirección General de Obras de Riego y Drenaje	-	-	10	10	10
5. Dirección General de Recursos Naturales Renovables	4	4	4	6	6
6. Departamento de Defensa Agropecuaria	10	10	9	28	28
7. Instituto Salvadoreño de Investigaciones del Café	3	3	3	3	3
8. Administración de Bienestar Campesino	69	73	81	85	76
9. Instituto de Colonización Rural	10	10	10	10	11
10. Compañía Salvadoreña de Café, S.A.	-	-	-	-	-
11. Federación de Cooperativas de Ahorro y Crédito de El Salvador	3	3	3	3	3
12. Banco Hipotecario de El Salvador	12	12	12	12	12
13. Agricultural Chemicals de El Salvador, S.A.	2	2	3	3	3
14. Cooperativa Algodonera Salvadoreña, Ltda.	2	2	2	3	3
15. Moore Comercial, S.A.	4	4	6	11	11
16. Federación de Cajas de Crédito	10	10	15	17	15
17. Avelar Hermanos	1	1	1	1	1
18. Bayer Químicas Unidas, S.A.	4	4	4	4	4
19. Quiñónez Hermanos, S.A.	3	3	3	3	3
20. Ministerio de Educación	-	-	-	6	12
TOTALES	260	263	299	385	381

SOURCE: Survey, Dirección General Economía Agrícola y Planificación, April, 1972.

PROJECT ENROLLMENT 1973-1977

	1972	1973	1974	1975	1976	1977
First Year	100	160	170	180	170	170
Second Year	73	80	128	136	144	136
Third Year	70	70	76	122	130	137
Fourth Year	00	00	00	35	35	35
TOTAL	243	310	374	473	479	478
Additional Professors	00	2	2	2	1	00

It is estimated that there will be 20% attrition of first year students.

It is estimated that there will be 5% attrition of second and third year students.

The number of teaching sections will be increased in 1975 to accommodate the increased enrollments.

	Students	Sections
First year	170 - 180	5
Second Year	130 - 140	4
Third Year	120 - 130	4
Fourth Year	35	1
		14

This situation takes into consideration the lack of classrooms.

PROJECTED PROGRAM FOR THE ESCUELA NACIONAL DE AGRICULTURA 1972-77

(Matriculation, Personnel, Budget, Investment & Costs per Student)

SCHOLARSHIPS AND TECHNICAL ASSISTANCE

	1972	1973	1974	1975	1976	1977
Total Matriculation	243	310	374	473	479	478
1st year	100	160	170	180	170	170
2nd year	73	80	128	136	144	136
3rd year	70	70	76	122	130	137
4th year	70	0	0	35	35	35
Expected Number of Graduates	70	70	75	155	155	155
Additional Enrollment	--	67	54	99	6	0
Operating Costs	767.420	975.000	1.030.000	1.090.000	1.150.000	1.200.000
Costs per student	3.160	3.150	2.760	2.300	2.400	2.500
Investments	----	461.000	322.000	140.000	38.000	38.000
Equipment	----	90.975	184.543	67.000	18.000	----
Additional Professors	----	2	2	2	1	0
Instructors	----	3	3	3	2	0
Other Employees	----	8	9	9	8	0
Number of Full time Advisors	5	5	5	5	5	5
Number of Part time Advisors	1/2 (3)	1/2	1/2	1/2	1/2	1/2
Technical Assistance Costs	350.000	350.000	350.000	350.000	350.000	350.000
Scholarships for personnel	7	9	9	9	9	9
Costs for scholarships	175.000 (1)	225.000	225.000	225.000	225.000	225.000

(1) Approximate annual cost per scholarship: 25.000
Approximate cost for short course scholarship: 7.000
(3) Equivalent to 6 man-months

TOTAL OPERATING COSTS	6.212.420
TOTAL INVESTMENT	999.000
TOTAL EQUIPMENT	360.518
GRAND TOTAL	7.571.938

ANNEX III
Exhibit S
Page 1 of 1

SALARY INCREASES FOR TEACHING PERSONNEL, ENA
COLONES PER MONTH

	1972	1973	1974	1975	1976	1977
1 Director	1,450	1,520	1,590	1,670	1,750	1,840
1 Head of Teaching	1,200	1,260	1,320	1,385	1,455	1,525
6 Department heads	1,000	1,050	1,100	1,160	1,220	1,280
1 Veterinarian	1,000	1,050	1,100	1,160	1,220	1,280
1 Short Course Coordinator	800	840	880	925	975	1,025
4 Professors 3	800	840	880	925	975	1,025
10 Professors 2	750	780	820	860	900	945
1 Student Advisor	700	735	770	810	850	890
2 Professors 1	500	525	550	580	610	640
1 Instructors 3	450	470	495	520	545	580
10 Instructors 2	350	365	385	395	415	435
3 Instructors 1	300	315	330	345	360	380

ANNEX III
EXHIBIT T
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SUMMARY OF CENTA TRAINING REQUIREMENTS
1973-1976

	FY 1973	FY 1974	FY 1975	FY 1976	Total Cost $	Number of Trainees
EXTENSION						
Man/Months long-term	144	108	156	144	—	29
M/M Short-term	66	66	54	48	--	27
$ A.I.D.	44,160	--	—	—	44,160	
$ GOES & Other	52,400	80,400	96,600	88,320	317,720	
RESEARCH						
M/M Long Term	168	144	96	72	--	45
M/M Short Term	28	18	32	38	--	26
$ A.I.D.	49,680	27,600	49,680	11,040	138,000	
$ GOES & Other	40,480	22,080	24,840	47,840	135,240	
EDUCATION						
M/M Long-Term	96	72	72	36	--	24
M/M Short-Term	72	48	48	24	--	7
$ A.I.D.	77,400	33,120	33,120	16,500	160,140	
$ GOES & Other	11,040	34,960	33,120	11,040	90,160	
TOTAL						
M/M Long Term	408	324	324	252	1,308	98
M/M Short Term	166	132	134	110	542	60
$ A.I.D.	171,000	60,720	82,800	27,540	342,300	
$ GOES & Other	103,920	137,440	154,560	147,200	543,120	

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ANNEX IV
EXHIBIT A
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Ten-Week AID/MAG Agriculture Sector Review Documents

The ten-week AID/MAG Agriculture sector review produced a number of analytical studies that have aided in the design of this loan project and the refinement of GOES goals. The documents, on which more than 15 MAG technicians participated under the supervision of two AID agricultural economists, were reproduced only as Spanish monographs at the time this loan project was prepared. English translations are being prepared of the final Spanish drafts of the following documents produced by the sector review:

1. Job Creation in El Salvadoran Agriculture.

2. A Benefit/Cost Analysis of Technical Assistance in El Salvador.

3. The Graduation Problem in El Salvador's Supervised Credit Programs.

4. Price Performance and Market Structures in El Salvador.

5. A Benefit/Cost Analysis of Vocational Agricultural Training in El Salvador.

6. An Evaluation of Mass Demonstration Techniques in El Salvador's Extension Programs.

English summary translations of Studies 1 and 2 are included here because of their immediate use in loan paper preparation.

Job Creation in El Salvadoran Agriculture
(English Translation and Summary)

Adequate cost-of-production estimates for most agricultural crops in El Salvador permit easy calculation of land, and labor requirements in different product output mixes. For example, with present technologies to achieve the output mix of commodities in 1970, El Salvador was using all of its land but only a half of its available labor force. A change in the product mix - say, more fruits and vegetables requiring more labor per unit of land - and the adoption of new technologies - cultivation practices such as multiple cropping, for example - permit employing a larger share of the available labor force on the same land area.

The analysis of creating jobs in agriculture permits estimating land and capital (credit) requirements to achieve full employment of labor in the agriculture sector within a fixed time period, say, five years. While the five-year time period is optimistic given needed advances in research, extension, marketing and land reform, this period is chosen to conform with the five-year span adopted in the National Development Plan.

Table 1 records the number of new jobs considered necessary to achieve full employment, given the increase in population and the levels of unemployment at present in rural areas. The Table is calculated on the basis of a gradual absorbtion of the unemployed over the five-year period 1973-1977.

Table 2 groups into six categories the crops for which cost of production data permitted analysis. The categories are ranked according to the amount of land and credit needed to employ one man/year of labor. Group I was adjusted for the use of multiple cropping that these crops allow. It should be emphasized that the table only considers a very limited number of choices of technology. Further analysis should stress other crop combinations such as those using grains with vegetables, fruits, etc.

Table 1: Number of New Jobs Required to Achieve Full Employment in Five Years

Year	Annual Increment of Labor Force 1/	Annual Reduction of Unemployment 2/	Total Number of New Jobs Required
1973	25,000	20,000	45,000
1974	26,000	30,000	56,000
1975	27,000	50,000	77,000
1976	28,000	80,000	108,000
1977	30,000	120,000	150,000
Total	130,000	300,000	430,000

1/ Based on an annual population increase of 3.0%; 60% rural population and 30% of these economically employed.

2/ Based on Estimations from the National Five-Year Development Plan 1973-1977.

Table 2: Grouping of Crops According to the Land and Labor Required to Employ One Man/Year 1/

	Group	Area Required to Employ One Man/Year (Ha.)	Credit Required to Employ One Man/Year (Colones)
I.	Vegetables & Tobacco	0.3--0.8	500 - 1,500
II.	Traditional Export Crops	1.0--2.0	900 - 1,800
III.	Basic Grains	2.0--5.0	400 - 1,200
IV.	Permanent Fruits	2.0--5.0	800 - 1,800
V.	Other Crops	3.0--5.0	1,200 - 3,000
VI.	Pasture Land and Beef Cattle	10.0	3,600

1/ Assuming between two and three crops a year and the interest on capital and rent on land is distributed evenly among crops.

Table 3 demonstrates the different land and labor requirements to reach full employment by two alternative technologies. Dedicated exclusively to the production of vegetable crops El Salvador would require 129,000 additional hectares of land and US $240 million in new agricultural credits by 1977 to achieve full employment. Alternatively, in pasture and cattle production, employment of the same labor force would require 4,300,000 hectares of land and US $168.0 million in credit. The land area required for full employment in cattle and pasture land is double the total area presently cultivated in El Salvador!

Of course, neither of these extreme choices of technology is suitable to adopt in El Salvador. The proper mix will involve a number of crops the land requirements for which must fall within the range of available areas for cultivation. The exercise does reveal, however, the importance of selecting the proper technology when one production factor -- in this case land -- is limited.

Table 3: Alternative "Technologies" for Achieving Full Employment in Agriculture

	Vegetables 1/		Pasture and Cattle	
	Area 1/ (1,000 Ha)	Capital 2/ ($1,000)	Area (1,000 Ha)	Capital 2/ ($1,000)
1973	13.5	9,000	450	67,000
1974	16.8	11,240	560	78,680
1975	23.1	14,320	770	100,240
1976	32.4	18,640	1,080	130,480
1977	45.0	24,000	1,500	168,000
Total	129.0	24,000	4,300	168,000

1/ Using the minimum land and capital requirements in Table 2.

2/ 80% of credits is timed over annually, thus reducing the total volume of capital necessary.

Comparison of 1970-71 Production, Land Use, and Yields of Crops Produced in El Salvador

Crop	1970/71 Production	1970/71 Area	1970/71 Yield	1980 Requirements 1/	1980 Additional area at current yield	1980 Necessary yield with same area: Yield 2/	1980 Necessary yield with same area: % increase
	qq	Ha.	qq/Ha.	qq	Ha.	qq/Ha.	%
Rice	625,000	11,900	52.5	2,047,343	21,997	172.0	228
Sorghum	3,200,000	123,900	25.8	2,788,002	-15,838	-	-
Corn	7,893,000	205,800	38.2	8,714,601	22,331	42.3	11
Beans	650,000	36,400	17.8	1,212,971	31,744	33.3	87
Cotton	1,200,824	62,475	19.2	1,521,340	16,761	24.4	27
Coffee	2,158,000	141,750	15.2	3,994,137	121,022 3/	27.8	83
Sugar Cane	33,437,840	19,625	1,704.0	62,389,814	16,909	3179.1	86
Panela (Cane)	5,972,684	4,740	1,260.0	5,107,442	- 586	-	-
Plátano	509,355	2,700	188.6	984,974	2,522	364.8	93
Bananas	996,660	7,910	125.0	1,732,689	5,842	219.0	74
Citrics	220,554	1,590	138.7	1,471,617	9,020	925.5	567
Cacao	6,615	400	16.5	37,265	1,858	93.2	455
Potato	61,740	400	154.4	315,536	1,644	788.8	411
Yuca	264,600	1,500	176.4	375,512	629	250.3	42
Other Vegetables	1,832,355	7,590	241.4	3,501,540	6,915	461.3	91
Other Fruits	2,787,120	9,070	307.3	4,178,034	4,526	460.6	50
Totals		637,750			247,275		

1/ Only cotton, coffee and sugar include export projections. The other crops are considered only on the basis of meeting domestic needs.

2/ In some cases, these yields are beyond what could be considered attainable by 1980.

3/ Coffee land has been reported by the GOES to be frozen at 141,750 hectares.

ANNEX IV
EXHIBIT C
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THE ECONOMIC SITUATION

In 1972 El Salvador finds itself in the fifth year of an economic slowdown which began in 1967-68 with a decline in cotton output and a deterioration in coffee prices. This situation was further aggravated by a decline in industrial expansion due to conflicts in the Central American Common Market - sporadic embargoes by Costa Rica and Guatemala on El Salvadoran textiles, shoes and other articles and the loss of Honduran markets by a breakout of war between the two countries in July, 1969.

GDP Trends

Selected annual trends reported in the AID Economic Data Book indicate that during 1961-1967 the average annual GDP growth rate was 6.7 per cent (2.5 per cent per capita), but from 1968-1971 the respective rates dropped to 3.7 per cent and -.15 per cent. The IMF identifies El Salvador as next to last in Latin America in terms of per capita real growth in the 1960's.

The expansion of agricultural production during the 1960's was modest--about 3.4 percent annually at 1961 prices--and was limited largely to the major export crops, reflecting increasing yields and, in the case of cotton, expansion of acreage as land was shifted away from corn pastures. Output of domestic food crops has not kept up with population growth and imports of these products have risen at an annual average rate of 5 percent during the decade.

In comparison, the growth rates of the industrial and commercial sectors have averaged 9.5 and 6.5 per cent respectively. Because of the different rates of growth among major economic sectors, there was some deterioration of agriculture's share of GDP relatively to industry and commerce (see Table 1).

A 1971 IBRD study estimates GDP growth after 1971 at average annual real rates of 4.5 per cent. In light of the uncertainties which have impeded forward movement in the first part of 1972, the current stalemate in CACM trade, a leveling off of some export prices and the cost of financing the coffee surplus, a real growth of five per cent in 1972 would be attainable. Further, significant expansion of exports of traditional products is unlikely, so improvements must come from the dynamism of the country's entrepreneurs, the development of high value nontraditional agricultural products for export and substitution for imports, as well as better use of the economy's financial leverage in exploiting external financing of its domestic investment needs. Growth prospects at a five per cent rate will, of course, bring annual per capita GDP growth to 1.5 per cent, not a happy long-term prospect.

Table 1

El Salvador: Trends in Gross Domestic Product - 1961-1971
(Constant 1962 Prices)

Year	GDP		Agriculture		Other Sectors	
	Total	% Growth	Total	% of GDP	Total	% of GDP
1961	1431.5		451.1	31.5	980.4	68.5
1962	1602.6	12.0	537.0	33.5	1065.6	66.5
1963	1671.6	4.3	518.4	31.0	1153.2	69.0
1964	1827.5	9.3	540.0	29.5	1287.5	70.5
1965	1925.6	5.4	517.2	26.9	1408.4	73.1
1966	2063.5	7.2	527.2	25.5	1536.3	74.5
1967	2175.7	5.4	557.7	25.6	1618.0	74.4
1968	2246.1	3.3	567.7	25.3	1678.4	74.7
1969	2324.8	3.5	588.6	25.3	1736.2	74.7
1970(p)	2405.7	3.5	622.0	25.9	1783.7	74.1
1971(p)	2509.2	4.3	640.9	25.5	1868.3	74.5
1961-1967 Average Growth		6.73	-	-	-	-
1968-1971 Average Growth		3.65	-	-	-	-
1961-1971 Average Growth		5.61	-	-	-	-

SOURCE: Revista Mensual, Central Reserve Bank
Indicadores Economicos y Sociales
CONAPLAN

(p) = preliminary

Foreign Trade Trends

El Salvador's economy is export led. The merchandise export elasticity of growth relative to the GDP has averaged 1.6 over the ten years 1961-1970. In the first half of the 1960's exports experienced a boom due to a surge in manufactures for the CACM and expansion of cotton production. In the 10 years 1962-1971 exports experienced an average annual growth rate of 9.9 per cent (see Table 2). With a falling off of cotton exports, a leveling off of CACM market penetration and, finally, the Salvadoran/Honduran conflict in 1969 with its attendant trade effects, exports moved in an uncertain direction. Absolute declines were experienced in 1969 and 1971 but for the four years 1968-1971 growth averaged 5.3 per cent. Of exports, an average of 70 per cent are agricultural with the remaining 30 per cent being industrial goods. Coffee has accounted for 70 per cent of agricultural exports, with cotton, sugar and shrimp accounting for the bulk of the rest.

El Salvador has experienced a deficit on the trade account for every year in the last decade and the Government has had to depend upon external and internal financing to cover these current trade account deficits (see Table 3). A comprehensive monetary program was begun in 1967 to achieve a balance of payments equilibrium. This included an increase in legal reserve requirements, a lower limit for the share of commercial lending in the bank's portfolio, tighter regulations on the use of foreign supplier credits by private importers, and selective import deposit requirements.

Public Revenue Performance

Government revenue performance can be characterized by its modest but gradually increasing burden on the national economy. Central Government income has grown at annual rates between 2 and 10 per cent over the last decade, the fluctuation in rates being conditioned largely by the country's export performance. Government collections still remained low at 11.1% of GDP in 1971, however, but have been supplemented by public domestic borrowing to finance budget deficits.

Central Government borrowing has increased considerably in the last three years. In 1971 gross borrowing represented 19.6 per cent of total government revenues as opposed to 3.0 per cent five years earlier. Internal borrowing increased greatly in 1969 when the Central Government issued government bonds to cover additional current

Table 2

El Salvador: Merchandise Trade Trends - 1961-1971
(US $ Millions)

YEAR	EXPORTS	% GDP	IMPORTS A/	PER CENT DOMESTIC CONSUMPTION B/	+ SURPLUS - DEFICIT
1961	129.6	9.0	129.0	10.0	+ .6
1962	149.8	9.3	146.6	10.6	+ 3.2
1963	150.2	8.8	152.3	10.4	- 2.1
1964	175.5	9.4	191.8	12.1	-16.3
1965	190.0	9.5	202.5	11.9	-12.5
1966	189.9	9.0	220.0	12.0	-31.1
1967	207.2	9.4	223.9	11.6	-16.7
Average Growth 1962 - 1967		12.9		15.8	
1968	211.7	9.2	213.5	10.5	- 1.8
1969	202.1	8.5	209.2	9.9	- 7.2
1970	229.1	9.0	213.6	9.4	+15.5
1971	228.4	8.6	249.2	10.6 C/	-20.8
Average Growth 1968 - 1971	5.3		6.3		
Average Growth 1961 - 1971	9.9		12.0		

A/ Source: Central Reserve Bank, Monthly Review

B/ Current Prices

C/ Domestic Consumption Estimated at 1970 proportion of GDP.

Table 3

El Salvador: Balance of Payments - End of Year - 1967-1971
(US $ Millions)

	1967	1968	1969	1970	1971[A/]
Exports of Goods & Services[B/]	230.7	238.0	226.0	256.2	
Imports of Goods & Services[B/]	265.9	261.3	259.4	267.0	
Current Account Deficit	35.2	23.3	32.8	10.8	30.0
Public Sector Financing, Net	7.0	7.8	12.9	2.6	
Disbursements	(11.3)	(11.9)	(17.1)	(9.4)	
Amortization	(4.3)	(4.1)	(4.2)	(6.8)	
Other Capital, Net[C/]	25.6	20.9	15.0	23.2	
Changes in Net International Reserves (-: increase in monetary sense)	2.6	-5.4	4.9	-15.0	0.0
Net International Reserves	37.0	42.4	37.4[D/]	52.4	52.4

Source: IBRD (data derived from Central Reserve Bank IMF, and IBRD estimates)

A/ Data on comparable basis not available for 1971; source for aggregate figures is Central Reserve Bank.

B/ Included international transfers.

C/ Includes private capital, commercial banks, and 1970's SDR's allocation of $4.2 million.

D/ Central Reserve Bank figure is $44.4 million; IBRD discounted assets from 60 day forward dollar purchases from internal sources.

expenditures of Salvadoran/Honduras conflict. Since 1969, the Central Government has continued to issue bonds for fiscal purposes, $3.7 million in 1970 and $8.0 million in 1971 for current expenditures, and a $9.2 million bond authority for 1972.

The Government has achieved in recent years a surplus on current account which could provide the counter-part funds for programs supported by external lenders (see Table 4). In 1971 this net public savings amounted to $22.4 million, or 18.7 per cent of the current revenue. The government's relatively conservative fiscal policy combined with tight controls on Central Bank liquidity, has been largely responsible for the country's monetary stability; the colón has not altered in value relative to the dollar since 1934.

Like most Central American governments, El Salvador's depends heavily on indirect taxes as a source of revenue. Although direct taxation in 1971 was 48.5 per cent above 1967 levels, it still accounted for only 23.3 per cent of the country's current revenues (as opposed to 69.7 per cent for indirect taxes). Presently the Government is reorganizing its Tax Administration Office with a view toward increasing the number of taxpayers and improving the auditing of tax returns. Low per capita incomes leave narrow margins for generating savings in the public sector will limit the Government's ability in the longer run to carry out essential investment programs. Still the present low tax burden and high rate of delinquent collections leaves room for increased tax revenues. A moderate objective proposed in IBRD/Government discussions would raise revenues at an annual average rate of 12.8 per cent of GDP in the years 1972-1976.

Public Current Expenditure Trends

Both the growth and allocation of government current and capital expenditures has been impressive in recent years particularly considering the economic adversities that the country has had to face. Between 1967 and 1971 Central Government expenditures increased by 50.5 per cent. In 1971 expenditures were 17.4 per cent above 1970, and planned 1972 expenditures represent another 9.7 per cent increase over 1971. Although these increases have necessitated increased internal and external borrowing, the GOES has not failed to achieve a net public savings (current receipts less current expenditures) to apply toward capital expenditures.

The allocation of the central government budget among its ministries serving various sectors of the economy, reflects the willingness

Table 4

El Salvador: Central Government Finances 1967-1972 (Actuals)
(Thousands of Colones)

	1967	1968	1969	1970	1971	1972[A/]
Total Current Income	225,814	229,877	251,955	281,837	299,750	316,600
Taxes	210,888	215,913	235,877	264,593	278,927	291,900
Non-Tax	13,139	12,251	12,856	13,901	18,014	21,100
Transfers	1,665	1,444	3,008	2,980	2,621	3,100
Other	122	269	214	362	189	500
Current Expenditures	188,146	201,426	209,241	232,537	243,684	249,017
Operations	140,889	147,532	154,384	158,766	175,936	201,655
Transfers	47,256	53,895	54,857	73,771	67,748	47,363
Capital Receipts	7,331	3,251	27,312	32,095	59,156	73,427
TOTAL RECEIPTS	233,145	233,138	279,267	313,932	358,906	390,027
Capital Expenditures	38,288	20,532	37,981	36,984	50,862	89,324
TOTAL EXPENDITURES	226,434	221,953	247,222	269,521	294,546	338,341
Available to Finance Investment	6,711	11,185	32,045	44,401	64,300	51,686

SOURCES: Data for 1967-1971 from Informe Complementario Constitucional 1969 and 1971.
Data for 1972 budget from Central Reserve Bank, Monthly Review, January, 1972.

A/ Budgeted.

of the GOES to financially support high priority development programs. During the last administration education, health and public works were considered particularly important to the country's development. Consequently, during the five year period 1967-71 annual government current expenditures were increased by 100 per cent for Education, 90 per cent for health and 600 per cent for public works and capital expenditures rose 1000 per cent, 400 per cent and 700 per cent for the three respective sectors (see Table 5). By comparison during the five year period of the last administration the central government's current and capital expenditures for agriculture rose only 40 per cent and 80 per cent respectively. Nevertheless, the emphasis on agricultural development by the new administration should be reflected in greater government appropriations for the sector in coming year's budgets. A 30 per cent increase for funding CENTA in the Ministry of Agriculture's 1972 budget is already a healthy sign.

Public Investment and Foreign Borrowing

El Salvador's historically limited commitment to national economic development is reflected in its low level of public investment and modest use of foreign borrowing. Government investment expenditures - only 25 per cent of total public and private capital investments - averaged about 2.5 per cent of annual GDP in the five year period 1967-1971. Some upward trend in the public investment share of GDP is visible though the figure fluctuates widely due to the rate of project approval, availability of external funds, and performance of public revenues.

Foreign borrowing to finance public investments has often been displaced by domestic borrowing through bond issues. After reaching a low in 1969, Central Government external borrowings increased markedly in 1970 ($5.0 million) and 1971 ($15.4 million) over the 1967 level of $2.9 million for capital expenditures (see Table 6). Additional external borrowings of $18.0 million are proposed in the Government's 1972 budget. In general, the Central Government's borrowing has been small by comparison to Government autonomous agencies. Total accumulated external public debt at the end of 1971 was ¢248.0 million, of which the Central Government accounted for ¢99.7 million (or 40%).

As a share of GDP, public foreign borrowing reached 4.2% of GDP in 1971 - domestic public borrowing reached 9.3% of GDP in the same year. Debt service payments - interest and amortization - on public

Table 5

El Salvador: Central Government Expenditures - Current and Capital by Sector
(1967-1971)

Expenditures	1967	1968	1969	1970	1971[a]
	(Millions of Colones)				
Current	196.7	206.6	248.4	224.4	285.9
Defense (Total)[b]	24.3	29.5	71.8	26.4	32.1
Agriculture	9.1	9.5	9.4	10.4	15.8
Education	58.7	60.7	65.8	69.0	98.6
Health	31.5	35.8	35.4	35.1	61.2
Transportation	8.5	8.6	20.2	20.6	20.6
Communication	2.2	2.2	12.1	13.0	13.3
Interest[c]	9.6	10.2	13.6	15.0	16.3
Other Current	52.8	50.1	20.1	34.9	28.0
Capital[d]	108.1	94.7	104.3	123.0	180.2
Agriculture	26.1	28.5	34.5	46.0	41.4
Education	3.7	4.9	5.3	4.4	22.9
Health	1.5	0.5	4.7	5.0	5.5
Transportation	11.1	6.5	13.9	26.1	44.0
Communication	-	1.9	4.5	3.9	7.8
Industry and power	26.2	27.6	27.0	26.7	41.7
Other capital	39.5	24.8	14.4	10.9	16.9
Total	304.8	301.3	352.7	347.4	466.1

SOURCE: AID Data Book.

[a]Budget estimates.

[b]Includes police elements of non-paramilitary nature.

[c]Estimated.

[d]Includes the capital outlay of government enterprises not financed by the central government as follows (millions of colones): 1967 - 16.1; 1968 - 21.0; 1969 - 30.1; 1970 - 11.6; 1971 - 32.2.

Table 6

El Salvador: Total Gross Fixed Capital Formation (1961-1970)
(U.S. $ Millions, Current Prices)A/

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
CONSTRUCTION	36.8	30.4	34.8	39.0	44.2	57.1	50.7	42.9	49.2	52.1
Public Sector	16.4	14.4	16.6	17.6	24.7	31.5	23.0	18.3	22.4	22.1
Private Sector	20.4	16.0	18.2	21.4	19.5	25.6	27.7	24.6	26.8	30.0
MACHINERY & EQUIPMENT	30.4	38.8	46.2	66.0	74.4	73.1	78.8	56.4	60.2	62.8
Public Sector	2.0	.8	1.0	1.7	7.6	8.0	4.6	5.2	3.6	4.8
Private Sector	28.4	38.0	45.2	64.3	66.7	65.1	74.2	51.2	56.6	58.0
TOTAL	67.2	69.2	81.0	105.1	118.6	130.2	129.5	99.2	109.4	114.9
Public Sector Per cent GDP	3.2	2.4	2.6	2.6	4.1	4.7	3.1	2.6	2.7	2.7
Private Sector Per Cent GDP	8.5	8.5	9.4	11.6	10.9	10.8	11.6	8.3	8.8	8.7
TOTAL Per cent GDP	11.7	10.9	12.0	14.2	15.0	15.5	14.7	10.9	11.6	11.4

A/ Abstracted from Table 2.3, IBRD Study CA-12a, which used Central Reserve Bank as source.

foreign borrowing averaged only 2.8 per cent of total export earnings over the five year period 1967-1971 (see Table 7). Projected debt service payments were not expected to rise much above these extremely low levels in the next decade according to World Bank calculations. With modest growth in export earnings of 6 per cent annually, the debt service ratio could be expected to rise no higher than 4.5% by 1977. This would still leave a comfortable margin for expansion of foreign indebtedness contracted to finance agricultural development projects.

While El Salvador's modest debt service ratio imposes no constraint to increased foreign borrowing, the use of more external capital is limited by the country's capacity to draw down new loans. In the past El Salvador has been handicapped in its utilization of external development financing by administrative limitations. Disbursements of foreign development loans fell sharply from about $20 million in 1965 and 1966 to an average of about $12 million in 1968-1970, and the proportion of public investment financed with domestic resources rose from about two-thirds to more than four-fifths in the same period. The new five year plan emphasizes selecting investment proposals on the basis of administrative feasibility, priority, and financing terms. Moreover, $1 million has been allotted for feasibility study preparation.

Summary

A major public investment program is necessary for a faster expansion of the economy and exchange earnings. Greater use of long-term foreign development loans can provide some of the resources to offset limited growth of traditional merchandise export earnings. But if the CACM crisis is not solved satisfactorily and soon, and no new exports are developed in the meantime, serious balance of payments difficulties could lie ahead. Credit and important restrictions needed to avoid a loss in foreign exchange reserves would bring an unfortunate curtailment to economic growth. The timely implementation of well planned public investment projects to achieve a faster rate of economic growth can be accomplished by the integration of improved administrative skills in the planning function with the international borrowing leverage that debt service ratios under five per cent provides.

Table 7

El Salvador: Service Payments on External Public Debt, 1968-1976
(US $ Millions)

Year	Service Payments[A/] (Interest and Amortization)	Exports of Goods[B/] and Services	Debt Service Ratios
1968	6.1	220.6	2.8
1969	6.2	214.5	2.9
1970	6.6	255.6	2.6
1971	7.8	264.0	3.0
1972	11.7	274.0	4.3
1973	9.6 (12.9)[C/]	287.2	3.3 (4.5)[C/]
1974	10.9	309.3	3.5
1975	7.9 (14.8)[C/]	333.7	2.4 (4.4)[C/]
1976	7.0 (16.0)[C/]	361.4	1.9 (4.4)[C/]

A/ 1968-1971 from Central Reserve Bank; projections from Table 4:2 of known external service requirements, IBRD Report CA-12a.

B/ Central Reserve Bank, Monthly Review, converted at ¢2.5 = $1.0 for 1968-1971; IBRD Growth Projections Table 3:4 Report CA-12a.

C/ Projected service requirements assuming additional external debt servicing, IBRD Report CA-12a, p.30.

LAND USE IN EL SALVADOR

1970

(hectares)

I	Permanent Crops		164,456
	Coffee	141,606	
	Other Crops	22,850	
II	Semipermanent crops		36,703
	Sugar cane	22,487	
	Other crops	16,216	
III	Annual Crops		428,728
	Cotton	62,475	
	Corn	205,940	
	Sorghum	2,170	
	Beans	22,540	
	Rice	11,900	
	Others and fallow lands	123,703	
IV	Pastures		664,920
	Natural pasture lands	550,363	
	Seeded pastures	114,557	
V	Brush and forests		250,321
VI	Area unavailable for agriculture		552,872
	TOTAL		2,100,000

Source: Figures from Five Year Plan, revised with the statistics from Dirección General de Economía Agrícola y Planificación and Dirección General de Cartografía.

BEHAVIOR OF FARM LABOR IN THE RURAL SECTOR
(1965-1970)

YEAR	Supply of Farm Labor: Man-days (000) (1)	Supply of Farm Labor: Pers.equiv. (000) (2)	Farm Labor Demand: Man-days (000) (3)	Farm Labor Demand: Pers.equiv. (000) (4)	Unemployment (5) 1-3	Pers. equiv. (000) (6)	Rate of Unemployment Increase (7)	Occupation coefficient (8) 3/1	Average Number of Work days* per Worker in the Rural Sector (9)= 8 x 257 / 100
1965	139,551	543	86,052	335	53,499	208	--	61.7	159
1966	143,149	557	86,531	333	57,618	224	7.7	59.8	154
1967	147,004	572	84,723	330	62,281	242	8.1	57.7	148
1968	150,859	587	88,035	343	62,824	244	.9	58.4	150
1969	156,770	610	88,327	344	68,443	266	8.9	56.3	145
1970	161,139	627	91,773	357	69,366	270	1.4	57	146
Average	149,745	583	87,407	340	62,678	244	5.3	58	149

*Assuming 257 workdays per year and equal opportunity to all the labor force.

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THE ZAPOTITAN VALLEY IRRIGATION PROJECT

The Zapotitan Valley lies about 30 kilometers west of San Salvador Because of its marshy condition, it was not until about 1930 that some drainage was done and farming began, although in an unplanned fashion. The Government of El Salvador, realizing the agricultura potential of the Valley to the national economy, has given this drainage and irrigation project top priority in its development plans. Since initiating the project in 1968, the major roads of th project have been completed and about half of the area has drainage ditches. Preliminary experimental plots have been established to provide information as to crops that can be grown successfully in the valley. It is hoped that horticultural crops such as potatoes, tomatoes, plantains, and onions can be grown in competition with those now imported from Guatemala so as to reduce the imbalance of agricultural trade that now exists.

There are some 7000 mz in the Zapotitan Project of which about 6300 mz will be cultivable when the project is completed. Of the approximately 4500 mz presently under cultivation, the land use in 1970 was estimated as follows:

	Annual Total Manzanas*
Rice	1650
Corn	1940
Beans	2390
Vegetables	1910
Sugar Cane	190
Fruits	15
Pasture	1380
	9480

Includes double cropping.

About 50% of the project area was, until recently held by only four ownerships, one of which was the GOES. With the passage of the Ley de Avenamiento y Riego in the latter part of 1970 which did not permit the ownership of more than 50 hectares (approximately 72.5 mz), the three large land owners sold the land in blocks of 50 hectares or less

to individuals. The GOES had hoped to buy this land for distribution to smallholders, the majority of whom have less than the minimum of two hectares established by the Law. According to a census made by the Ministry of Agriculture and Livestock in 1970, the size of farm distribution was as follows:

Farm size (hectares)	No. of farms	Average size (has.)	Total Has.
ICR farms	643	1.0	648
Less than 3.0	257	1.1	285
3.0 to 5.0	73	3.9	285
5.0 to 10.0	50	6.8	340
10.0 to 25.0	31	14.7	456
25.0 to 50.0	12	37.8	453 (42 GOES)
50.0 to 100.0	7	66.4	465
100.0 or more	4	371.8	1487 (131 GOES)
Total	1077		4419 (173 GOES)

The marketing of current production is somewhat difficult. One study pointed out that of 121 farms, 82 could not always be reached by motorized vehicles during the wet season and 20 not even by ox-cart. The small producers generally sell to buyers who come to the farm and often they do not have any idea of reasonable prices for their products. Those who are able to get their products out of the area and sell in the nearby town or along the roads fare better, but even so, they have little bargaining strength.

DEMAND/SUPPLY RATIO OF LABOR IN RURAL AREAS 1/
BY YEARS & BY MONTHS
(IN PERCENTAGES)

YEAR	JAN.	FEB.	MARCH	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	AVERAGE
1965	94.96	60.26	51.29	37.93	64.89	55.21	64.01	47.11	44.22	36.17	101.81	82.10	61.66
1966	84.97	59.54	53.34	41.25	63.76	55.21	61.59	43.30	39.77	35.45	100.26	78.55	59.75
1967	72.95	51.21	47.17	35.15	60.43	51.61	58.38	42.48	39.61	34.72	105.89	92.00	57.63
1968	82.16	55.07	47.76	36.54	60.85	53.77	59.82	45.17	42.68	35.46	101.21	79.78	58.36
1969	74.47	51.93	45.45	33.26	55.42	49.72	57.80	44.95	41.54	34.16	100.73	86.66	56.34
1970	79.93	51.28	45.68	33.97	57.77	51.12	59.53	46.20	43.26	34.61	99.29	80.69	56.95
AVERAGE	81.57	54.88	48.45	36.35	60.52	52.77	60.20	44.87	41.85	35.10	101.53	83.30	58.45
SEASONAL UNEMPLOYMENT 2/	-	5.64	12.07	24.17	-	7.75	.32	15.65	18.67	25.42	-	-	2.07
REAL UNEMPLOYMENT 3/	18.43	45.12	51.55	63.65	39.48	47.23	39.80	55.13	58.15	64.90	- 1.53	16.70	41.55

1/ ASSUMING A CONSTANT DISTRIBUTION OF RURAL LABOR AVAILABILITY DURING THE 12 MONTHS OF THE YEAR.

2/ SEASONAL UNEMPLOYMENT ASSUMING THAT THE RATIO OF 60.52 FOR THE MONTH OF MAY ABSORBS ALL THE PERMANENT SUPPLY OF THE TRUE LABOR FORCE.

3/ REAL UNEMPLOYMENT, ASSUMING THAT ALL THE ECONOMICALLY ACTIVE POPULATION IS AVAILABLE DURING THE 12 MONTHS OF THE YEAR.

SOURCE: SUMMARY OF THE DIAGNOSTIC STUDY FOR THE 5 YEAR PLAN 1972/77, CHAPTER 4, LABOR.

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ANNEX IV
EXHIBIT I

El Salvador: Number and Area of Farm Units According to Size, 1961

Size Class	Farm Units		AREA		
	Number	Percent of total	Total (hectares)	Percent of total	Median Size (hectares)
All classes	226,696	100.0	1,581,428	100.0	6.96
Less than 1 hectare	107,054	47.2	61,355	3.9	0.57
1-9.9 hectares	100,245	44.2	284,804	18.0	2.84
10 - 49.9 hectares	15,235	6.7	326,054	20.6	21.40
50 - 199.9 hectares	3,335	1.5	313,202	19.8	93.91
200 and more hect.	1,027	0.5	596,002	37.7	580.33

Source: Data from the Censo Agropecuario, as summarized by Grupo de Tenencia de la Tierra, CIDA/CAIS. El Salvador: Caracteristicas Generales de la Utilización y Distribución de la Tierra. Mexico, D.F. 15 de Agosto de 1968

EL SALVADOR: NUMBER AND AREA OF FARM UNITS ACCORDING TO TENURE OF OPERATOR, 1961

TENURE STATUS	NUMBER		AREA	
	TOTAL	PERCENT	HECTARES	PERCENT
ALL CLASSES	226,896	100.0	1,581,428	100.0
OWNER	89,918	39.6	1,125,221	77.5
RENTER	43,457	19.1	70,877	5.0
PART OWNER	29,850	13.1	123,319	7.8
OWNED	---	---	79,878	5.1
RENTED	---	---	43,441	2.7
COLONIST A/	55,769	24.6	44,076	2.8
OTHER FORMS	7,947	3.6	109,935	7.0

A/ A COLONIST RESIDES ON A FARM PROPERTY AND RECEIVES A PLOT OF LAND FOR WHICH HE MAY PAY CASH RENT, A SHARE OF THE CROP, OR A SPECIFIED AMOUNT OF LABOR.

SOURCE: GRUPO DE TENENCIA DE LA TIERRA, CIDA/CAIS, OP. CIT., P. 61
BASED ON CENSO AGROPECUARIO, 1961

TOTAL AMOUNT OF FINANCING BY CREDIT INSTITUTION AND BY PRODUCT DURING THE PERIOD 1966 - 1970 IN THOUSAND OF COLONES

Sub-Agricultural	Commercial & Mortgage Banks	%	Small Farmer Bank	%	Mutual Loan Federation	%	Cotton Cooperative	%	Salvadoran Coffee Association	%	TOTAL	% by Product related to the Total
Coffee	237,708	80.4	---	---	538	0.02	----	--	56,960	19.4	293,206	36.10
Cotton	172,685	80.9	14,405	6.7	3,593	1.7	22,818	10.7	---	--	213,501	26.30
Sugar Cane	38,907	97.0	728	1.8	471	1.2	---	--	---	--	40,106	4.90
Corn	12,583	45.3	10,114	36.4	5,107	18.3	----	--	---	--	27,804	3.40
Rice	13,005	77.7	2,246	13.4	1,480	8.9	----	--	---	--	16,731	2.10
Bean	1,142	34.8	1,492	45.5	644	19.7	----	--	---	--	3,278	0.40
Sorghum	1,332	49.2	919	33.9	458	16.9	----	--	---	--	2,709	0.30
Oil Crops	286	54.9	142	27.3	93	17.8	----	--	---	--	521	0.06
Other Fibers	2,926	99.9	---	0	4	0.1	----	--	---	--	2,930	0.36
Fruits	1,296	62.1	667	31.9	121	6.0	----	--	---	--	2,085	0.30
Vegetables	65	5.2	901	70.9	303	23.9	----	--	---	--	1,269	0.20
Tobacco	119	89.5	---	0	14	10.5	----	--	---	--	133	0.02
Various	18,251	99.9	---	0	11	0.1	----	--	---	--	18,262	2.30
Re-financing	115,200	100.0	---	0	---	0	----	--	---	--	115,200	14.20
Pasture	---	0	165	78.9	44	21.1	----	--	---	--	209	0.03
Sub-Total Credit Operation	613,505	93.2	31,779	4.8	12,882	2.0	22,818		56,960		737,944	
Sub-Total Credit Capitalization	22,441	88.1	1,421	5.6	1,609	6.3	----		----		25,471	3.10
Sub-Total Sub-Sector Agricultural	635,946	93.0	33,200	4.9	14,491	2.1	22,818		56,960		763,415	

TOTAL AMOUNT OF FINANCING BY CREDIT INSTITUTION AND BY PRODUCT DURING THE PERIOD 1966 - 1970 IN THOUSAND OF COLONES -- (CONT'D.)

Sub-Sector Livestock	Commercial & Mortgage Banks	%	Small Farmer Bank	%	Mutual Loan Federation	%	Cotton Cooperative	%	Salvadoran Coffee Association	%	TOTAL	% by Product related to the Total
Cattle	13,492	62.8	3.789	17.6	4,204	19.6	----	---	----	---	21,485	2.60
Hogs	382	67.0	69	12.1	119	20.9	----	---	----	---	570	0.07
Goats & Sheep	183	100.0	---	---	---	--	----	---	----	---	183	0.02
Horses	----		---	---	---	--	----	---	----	---	---	--
Poultry	6,314	95.0	120	1.9	209	3.1	----	---	----	---	6,643	0.80
Bees	651	91.8	37	5.2	21	3.0	----	---	----	---	709	0.09
Various	2,401	100.0	---	---	---	---	----	---	----	---	2,401	0.30
Re-financing	3,822	93.9	247	6.1	---	---	----	---	----	---	4,069	0.50
Sub-Total Credit Operation	27,245	75.6	4,262	11.8	4,553	12.6	----	---	----	---	37,060	--
Sub-Total Credit Capitalization	9,242	77.3	1,102	9.2	1,609	13.5	----	---	----	---	11,953	1.4
Sub-Total Credit Livestock	36,487	75.8	5,364	11.4	6,162	12.8	----	---	----	---	48,013	--
TOTAL AGRICULTURE AND LIVESTOCK	672,433	82.9	38,564	4.8	20,653	2.5	22,818	2.8	56,960	7.0	811,428	100.0

Source: Diagnostico del Financiamiento Institucional al Sector Agropecuario, MAG, 1966-70.

A Benefit/Cost Analysis of Technical Assistance in El Salvador
(English Translation and Summary)

The purpose of this analysis was to evaluate public investments in agricultural technical assistance - research, education and extension - in El Salvador. Because payoffs are long-term and returns to investments are largely external, the public sector has been the major provider of technical assistance in El Salvador. Because of the wide range of activities financed by the government in its technical assistance programs, an analysis of costs and benefits can be a useful tool in setting priorities among these activities. The analysis conducted here is a first trial. Better approximations and quantification of benefits and costs will be undertaken in future evaluation of CENTA programs. Attempts will be made to estimate social benefits and other economic gains not possible to analyze in this first exercise.

A. Economic Costs

For the purpose of this analysis, we have considered as costs the expenses incurred by the public sector, such as salaries of the extension agents, as well as administrative personnel, and other expenses such as transportation, travel expenses, materials and provisions, equipment, etc. The cost of agricultural education at a medium level has been established, based on the cost of providing ENA graduates. The operating budget plus the funds from special activities were considered in order to establish the cost of agricultural research.

Table 1: Technical Assistance Program Costs
(Thousands of Colones

Budget	1968	1969	1970
Extension	¢ 1,819	¢ 1,380	¢ 1,182
Education	26	37	41
Research	1,960	1,320	1,273
Total	3,805	2,737	2,437

Source: Memorias del MAG 1967/68 a 1970/71.

Table 2: Economic Benefits from Principle Crops Receiving Technical Assistance 1968 - 1970

Product	Selling Price (¢/MT) (1)	Cost of Production (¢/MT) (2)	Area Cultivated (Ha) (3)	Increments Yield (MT/Ha) (4)	Quantity (MT) (3x4=5)	Gross Value (¢1000) (1x5=6)	Cost (¢1000) (2x5=7)	Net Value (¢1000) (6-7=8)
1968 (Total)								
Corn	164	141	3,575	1.44	5,148	842	726	(2,456)
Sorghum	133	182	569	1.20	683	91	124	116
Beans	410	296	338	.29	98	33	29	33
Rice	285	223	2,329	2.26	5,264	1,501	1,174	4
Cotton[1]	-	-	14,108	-	-	-	-	327
								1,975
1969 (Total)								
Corn	153	141	5,210	1.37	7,138	1,090	1,006	(3,477)
Sorghum	120	182	--	-	-	-	-	84
Beans	329	296	3,761	.08	301	122	89	43
Rice	259	223	637	.99	631	163	141	23
Cotton[1]	-	-	18,692	-	-	-	-	3,327
1970 (Total)								
Corn	154	141	8,625	1.14	9,833	1,511	1,386	(6,536)
Sorghum	103	182	1,151	.09	104	11	19	124
Beans	567	296	3,043	.34	1,035	587	306	8
Beans[2]	567	296	6,566	.21	1,379	782	408	280
Rice	291	223	780	1.11	876	255	195	374
Cotton[1]	-	-	21,069	-	-	-	-	60
								5,689

[1]Benefits as savings in pest control and in increased fibre and seed yields.

[2]Special Bean Program.

B. Economic Benefits

In order to determine the net economic benefits of the program of technical assistance, we considered the following variables: output, yields, land area, income, costs, and prices at the producer level. (See Table 2). For the purpose of the analysis, we considered those products receiving most technical assistance: corn, sorghum, beans, rice and cotton. Beans have been served by a special program, in addition to the regular program, since 1970, as well as cotton since 1966. In addition to the above mentioned products, the extensionists provide technical assistance on a lower scale to fruits, vegetables, oil seeds and soil conservation.

The land area covered by technical assistance for the above mentioned crops was obtained from the Ministry of Agriculture. The net income from cultivation of basic grains receiving technical assistance, was obtained from the Annual Reports of the Ministry, and the net income from cotton was obtained from Cooperativa Algodonera Salvadoreña, through a survey carried out by members of the group in charge of the preparation of this document. The crop yields by area was obtained from the Anuario de Estadísticas Agropecuarias, May 1971, from Dirección General de Economía Agrícola y Planificación. Basic grains production costs were taken from the study "Costos de Producción de Granos Básicos" from MAG. The costs for cotton were obtained from Cooperativa Algodonera Salvadoreña Ltda.

Prices, at the producer level, for basic grains were obtained for 1971 through a direct survey carried out by MAG among farmers in intensive production areas of the country. In order to determine the prices at the producer level, for the years 1966/1970, a margin was developed between the price at producers level for 1971 found through the survey and the wholesale price in the Salvadoran markets during the same year. The wholesale prices in the Salvadoran markets were obtained from the Dirección General de Economía Agrícola y Planificación del MAG for the complete period being analyzed. The producer price level for cotton was obtained through direct information from Cooperativa Algodonera Salvadoreña Ltda. We considered both the price for the seed and the price of the fiber.

The gross value accruing to technical assistance for the basic grains was determined by taking the difference between the yields

in MT/Ha. on farms visited by the extension agents and the national average yields, and multiplying this difference by the number of hectares attended and by the selling price of the products at the farm level. We deducted from the gross value resulting from the program of technical assistance, the production cost, thus determining the net income.

In addition to the benefits accruing to cotton due to the increase in yields, we must add the economic benefits resulting from the savings due to the adequate control of pests programmed and planned by the Cotton Department. These savings run from ¢146, 10, 162 and 148 per hectare, for the years 1967, 1968, 1969 and 1970 respectively. The total savings resulting from this activity were estimated by multiplying the saving per hectare, for the number of hectares attended through the cotton program, during each of the years of the period being analyzed.

C. Results of the Analysis

The benefit/cost ratios from technical assistance resulting from the present analysis range from 0.6 to 1 for 1968 to 2.6 : 1 for 1970. (See Table 3).

Table 3: Benefit/Cost Ratios for Technical Assistance 1968-1970
(Thousands of Colones)

Year	Benefits	Cost	Ratio
1968	2,456	3,805	0.62:1
1969	3,477	2,737	1.27:1
1970	6,535	2,496	2.61:1

Source: Tables 1 and 2.

The improvement in this short period (1968-1970) is primarily due to the fact that the problems being addressed by the different programs and projects that have been developed have been approached on a more practical basis. Projects with little or no impact on the national agricultural economy have been excluded and new projects with greater social and economic repercussions have been added and strengthened (among these were cotton and beans). Of the economic benefits resulting from the different programs and projects of technical assistance, 87% of the total are a result of the cotton program. The benefits from the program for beans contributed 6% of the net income from the technical assistance program.

When preparing the cost/benefit analysis, we did not include the economic benefits (due to the lack of information) that result from the direct communication between research people and the farmers, who are in this way receiving extension services. It is estimated, that a high percentage of the information being disseminated, which should be sole responsibility of the extension agents, is carried out in the above manner.

The physical size of the program and the benefit/cost ratios are not the only indicators that must be taken into consideration to establish any program or project. There are intangible social benefits and motivations, which are of great importance and that must be justly weighed, although in an abstract or subjective manner, for the complete and real evaluation of any program.

The analysis also included examination of those internal-administration, salaries, vehicles, coordination-and-external markets, credit, communications-constraints to improving the benefits over costs of the research, extension, and education components of technical assistance. The summary and (recommendations) of these results is as follows:

D. Agricultural Research

1. There are many benefits from research kept in files which have not reached the farmers. (Prepare an inventory of these benefits and expose it to the extension agents, investigators and people in general).

2. There have never been definite and well guided investigation policies. (Form a committee whose members have full knowledge in all aspects: technical, economical and social, of the problems of the agricultural sector, which will determine all the features of the policy to follow during the investigation).

3. There seems to be some confusion at present with regard to the administrative organization of some of the services, mainly regarding the acquisition of materials, essential for the research. This, together with the annoying legal dispositions in force, hurts in a drastical manner, the investigations being accomplished. (Reorganize the personnel and review the procedures, in order to impart more activity to the purchase transactions).

4. The salary levels of the investigators do not offer great encouragement for their perseverance. (Raise the salaries to standards at least comparable to other public agencies for activities that require training and to establish a roster, taking into consideration the academic preparation and length of experience of the employee)

5. Lack of installations, agricultural equipment and adequate machinery. (Provide the investigators with installations and adequate agricultural equipment and machinery for an efficient completion of the research activities).

6. Lack of installations, equipment and necessary materials for the laboratory tests. (Provide the laboratories with the neccesary materials and equipment for the good performance).

7. Inadequate number of serviceable vehicles. (Provide the service with adequate vehicles for the efficient accomplishment of the assigned responsibilities).

E. Agricultural Extension

1. Excessively low salaries compared with other institutions of the group and with the private industry for similar activities and consequently a high escape of personnel. Actually (1972) more than 50% of the rural personnel has been serving less than a year in their

present employment. (Raise the minimum and maximum levels of salaries and establish a roster considering the background and experience.)

2. Almost all extension agents need a vehicle to perform their duties. (Provide the extension agencies with vehicles, after a study of the road conditions in the areas serviced to attend).

3. During the last few years, Extension Agrícola has rendered almost exclusive attention to social goals, thus almost completely deviating the attention from the accomplishment of economic goals of short and medium terms. (Excluding the special programs for beans and cotton). The use of objective methods with enough force of conviction such as the result demonstrations has been overlooked and excessive use of subjective methods of education such as method demonstrations, speeches, bulletins, etc. (Focus all the aims of Extension towards the attainment of economic and social benefits).

4. Extension Service lacks specialists. (Prepare specialists and create the necessary positions).

5. There is administrative deficiency in the majority of Agricultural Extension Agencies. (Properly train the heads of the agencies through seminars and special courses on administrative organization, planning and evaluation).

6. There is a lack of training programs for Extension Agents. (Elaborate a training plan for the Extension Agents).

7. The labor of the Extension Agents is lessened by marketing problems facing producers being served. (Study the problems of commercialization in each area and, in a joint manner with the specialized organizations, seek alternative solutions).

8. Faulty coordination with the Agricultural Credit Institutions that assist the small and medium farmers. (Improve coordination with those institutions).

F. Agricultural Education (ENA)

1. Salaries of the educational personnel are relatively low compared with other MAG institutions and private industry. (Raise

the salaries of the educational personnel at least to equal the levels of the other MAG branch offices, according to academic training, experience and years of service).

2. Lack of vehicles for the fulfillment of educational purposes. (Provide the institution with an adequate number of serviceable vehicles.)

3. Machinery and agricultural equipment are limited, obsolete and in bad conditions. (Provide the institution with modern machinery and agricultural equipment).

4. Lack of facilities in installations for greenhouses, stables, dairy plant, irrigation systems, warehouses, grain drying systems, silos, etc. (Supply ENA with the necessary facilities to allow them to prepare their graduates more efficiently).

5. There is no coordination between investigators and the members of the educational personnel at ENA. (Include investigators in conferences to the ENA students about their major field of studies and that the fields of investigation be familiar to the ENA students).

6. The basic services as electricity, drinking water and sewage are inadequate. (Extend these services to adequate levels).

7. No existing areas of specialization for students or graduates. (Create new facilities and specializing programs).

ANNEX V

ENGINEERING TECHNICAL DATA

Description

DETAILED ENGINEERING AND CONSTRUCTION ANALYSIS

A. Description of Construction Portion of the Project

The proposed project includes the construction of 63 buildings The breakdown of the loan-assisted buildings to be constructed, equipment, furniture, vehicles, construction supervision and technical assistance is shown in Part 4, Section VI.

The location of each one of the buildings at CENTA is shown on the map of the site. (Page 9 in this Annex).

Each building will have basic facilities consisting of electricity, potable water, porcelain flush sanitary facilities including sewage systems. The San Andrés facilities will have an expanded water supply system and sewerage facilities to fulfill the needs of the additional facilities to be constructed at the site. The regional and zonal CENTA field units will be supplied by commercial systems.

Location of Regional and Supporting Centers are shown on the map of El Salvador on page 10 of this Annex.

Skilled labor adept in building construction is abundant in El Salvador. The CENTA school site at San Andrés is 33 kms. from San Salvador, any special type labor that is not found at the location will be imported to the construction site. Because of the short distance of travel time, it is anticipated that contractors will not elevate their labor charges. Importation of materials to the construction site will be relatively easy and inexpensive. As construction is programmed from 1973-75 provision has been made in the cost estimates for contingencies due to price increases of material and labor of 15%.

Regional Labor and Material Costs for Regional Centers

There are at present approximately 17 construction firms capable of undertaking the construction planned. The Mission, through the school construction program under Loan 519-L-014, has worked closely with 10 of these construction firms and considers any one of them to be responsible and capable of undertaking the construction work planned under this program. Overall construction demands in San Salvador are not anticipated to be so great in the future so as to preclude their participation. There is no reason why the condition

of competition that exists at present should not continue to exist. Also a number of small contractors have become more sophisticated in their preparation of bids (School construction program) in recent years and can be expected to bid on the projects.

B. Engineering and Construction Plan

The construction segment of the project will be administered by the Government of El Salvador by the Ministry of Agriculture with direct implementation responsibility placed or its Planning and Maintenance Divisions, CENTA Engineering and Architectural Department. All the actual supervision of the construction will be done by a qualified Engineering Consulting firm, financed under the loan, which will permit the Planning and Maintenance Division to concentrate on the overall supervision and implementation of the construction program and the on-going maintenance program. The engineering consulting individual or firm will be responsible for the preparation of the final building construction plans and specifications, supervision of the competitive bidding processes, and the supervision of the construction. While the execution of the project will be entirely the responsibility of the Borrower and its executing agency CENTA, A.I.D. will monitor its implementation through regular inspections by the Mission engineer and, periodically, ROCAP and AID/W engineering staff. Using this system of engineering management, the Ministry of Agriculture and CENTA will be able to implement the project in a timely and effective manner.

The construction will be done by construction contractors with construction contracts awarded on the basis of competitive bidding. Contractors eligible to bid for the work will be limited to United States or other Code 941 and CACM (including joint ventures) firms.

A 28 month construction program is anticipated. The buildings will be advertised for bidding in groups or one by one.

Construction priority of each building or group of buildings will be determined by the Ministry of Agriculture and agreed to by U.S.A.I.D.. The timing of construction will be decided on the basis of weather and time of year, to minimize costs of construction.

Competitive bidding for the construction will be accomplished in accordance with A.I.D. requirements and Salvadoran law.

It is expected that initiation of the construction will begin 9 months after the ratification of the signed loan agreement by the National Assembly and will continue for 24 months. The following is a breakdown of the implementation schedule.

1. Meeting conditions precedent, selecting building priorities procurement of Consultant Engineering services, final design, bidding for first buildings: December 1972 to December 1973.

2. Construction January 1974 (initial facilities) December 1975.

3. Final Acceptance and Payment: December 1975.

C. Design and Cost Estimating Criteria

The preliminary plans of the buildings and laboratories included in the project have been prepared by the CENTA Architect in coordination with the Architect Division of the Ministry of Agriculture.

The tropical climate of El Salvador is an important factor in the architectural design of the facilities. In addition to allowing for the future expansion of the facilities, the buildings have been so designed, as were the educational facilities of ENA at San Andrés, to take advantage of prevailing winds, sunlight and other climatic conditions of the locality.

The USAID agricultural advisors and engineer will review the final selection of all sites for the construction of the San Andrés facilities and the regional and supporting centers of CENTA.

Each site will be suited for the building type of construction and will be carefully inspected by the consultant engineer to ascertain that the site conditions will not require any special foundation or structural design. Site selection, will be based on suitability for combined reinforced concrete and cyclopean concrete spaced footings and light structural concrete columns. The site selected will meet the following minimum criteria:

1. Title of the entire land must vest in the Ministry of Agriculture unconditionally.

2. Functionally suitable for each building's requirements.

3. Reasonably flat to minimize site development costs.

4. Devoid of open sewers, cesspools, ditches or drainage pits, garbage dumps and incinerators.

5. Electric power will be available at all building sites.

6. Water will be available at all building sites.

7. The soil bearing value must be suitable for the intended type building construction of foundations at reasonable costs.

8. There must be no serious rock condition that will require expensive removal.

9. Devoid of encroachments of every character including buildings, fences, etc.

10. Devoid of sub-surfaced obstructions such as tanks, old foundations and utility lines.

11. Sufficient slope for proper drainage.

12. Devoid of swamps, exposure to flooding erosion, landslides and other natural hazards.

13. That all buildings can be oriented on the site to take advantage of climatic conditions.

14. Free of excessive noises from industry, railroad, foundries highways, etc.

The basic designs consist of reinforced concrete and cyclopean concrete foundations; structure of reinforced concrete and cement tile floors over a compacted solid base; glass louver type windows; metal and reinforced concrete roof supports; asbestos cement roofing.

The materials to be used are of the same as those being used in the construction of schools under the A.I.D. loan 519-L-014. This type of design has proved by experience to be the most economically because of the availability of these materials locally. No problems are anticipated in the availability of materials.

General Construction Standards

The design of the buildings will satisfy U.S. and Salvadoran codes and building standards. Construction will be done with high quality materials in a design which will make all buildings as indestructible as possible, due to exposure to earthquakes. The following design standards are those which will make maximum use of materials available in El Salvador.

LIST OF DESIGN STANDARDS

Item		Standards
Foundations		Reinforced concrete and cyclopean Concrete
Floors		Cement tile on a solid base
Structural		Reinforced concrete and reinforced concrete brick or block frame
Exterior and Interior Walls		Concrete block, clay brick walls
Ceiling		Asbestos cement, or plywood
Roof support		Metal and reinforced concrete supports
Roof		Asbestos cement, corrugated sheath
Windows		Aluminum glass jalousie
Doors		Metal, wood, plywood
Paint		Anti-corrosive for all metal, oil base for wood and rubber base for walls.
Electrical		Will conform to U.S.and Salvadoran codes.
Plumbing		Will conform to U.S. codes. Consists of rest-room facilities and laboratory facilities
Road, walks, etc.		Gravel, asphaltic pavement, Interconnecting sidewalks of unreinforced concrete.
Water supply:	Source:	Well water at the site.
	Storage	Elevated asbestos cement tanks
	Distribution System	Galvanized steel pipe or PVC to conform to U.S. codes

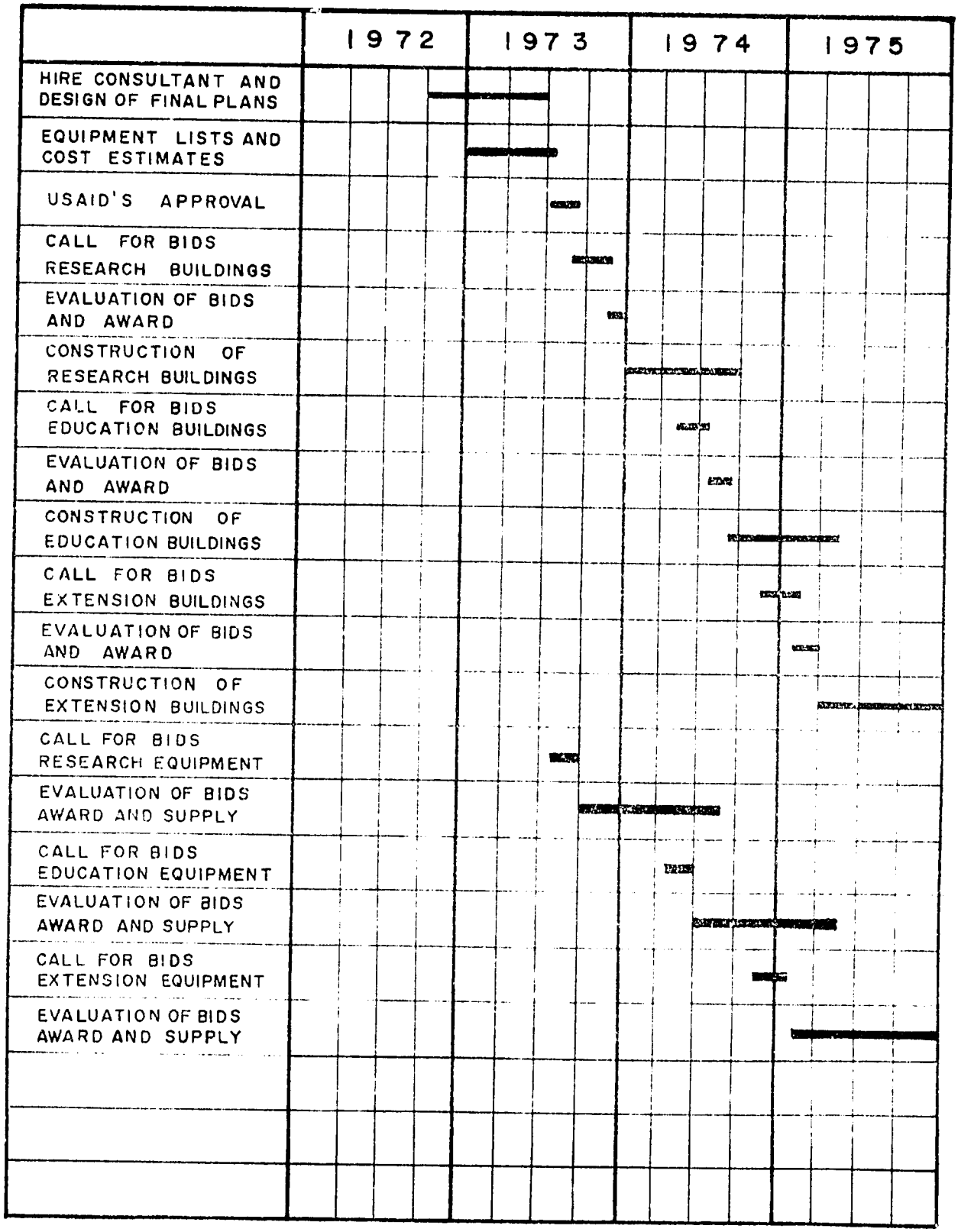
Item	Standards
Sanitary Sewer Disposal	
Collection system	Concrete pipe
Treatment:	Oxidation Lagoon

Cost estimates were prepared by the Ministry of Agriculture's Architectural Engineering Division and reviewed by the Mission engineer. The cost estimates were prepared by calculating actual material and labor costs at the rates listed in the "Salvadoran Directory of Construction Labor Costs" published by the "Labor Union of Construction Workers". The Directory contains the unit construction costs as agreed upon between the "Union of Construction Workers" and the local construction industry. The calculation and rationale of each estimate prepared by the Ministry of Agriculture's Architectural Engineering Division has been reviewed by Mission Engineer. In addition, the cost estimates have been compared against the actual prices of construction contracts recently let under the IBRD loan which is financing the expansion of the ENA facilities at San Andrés. The cost estimates for the construction under the loan are considered reasonable.

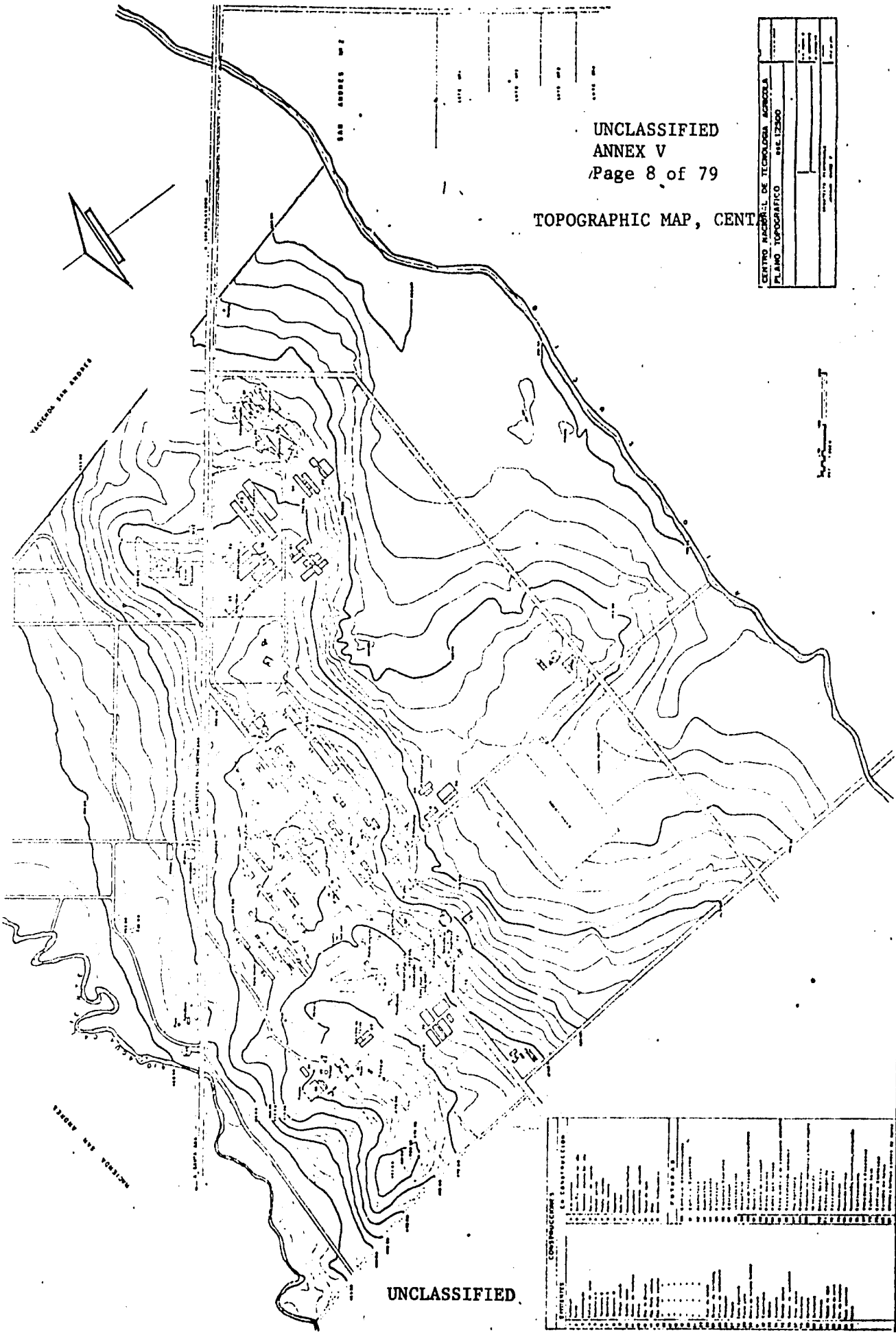
D. Maintenance

Maintenance is the responsibility of CENTA. Present facilities at San Andrés and Santa Tecla are maintained very well and the maintenance services are well staffed and equipped. The maintenance budget for ENA and the Research Division is presently 25% of annual budgets and is sufficient to maintain the buildings properly. As the record of the CENTA institution is very good and with their stated intention to continue the same proportion of maintenance funding, the Mission sees no problem with future maintenance. According to standard AID procedures, the Borrower will covenant in the loan agreement to adequately maintain the buildings constructed under the loan program.

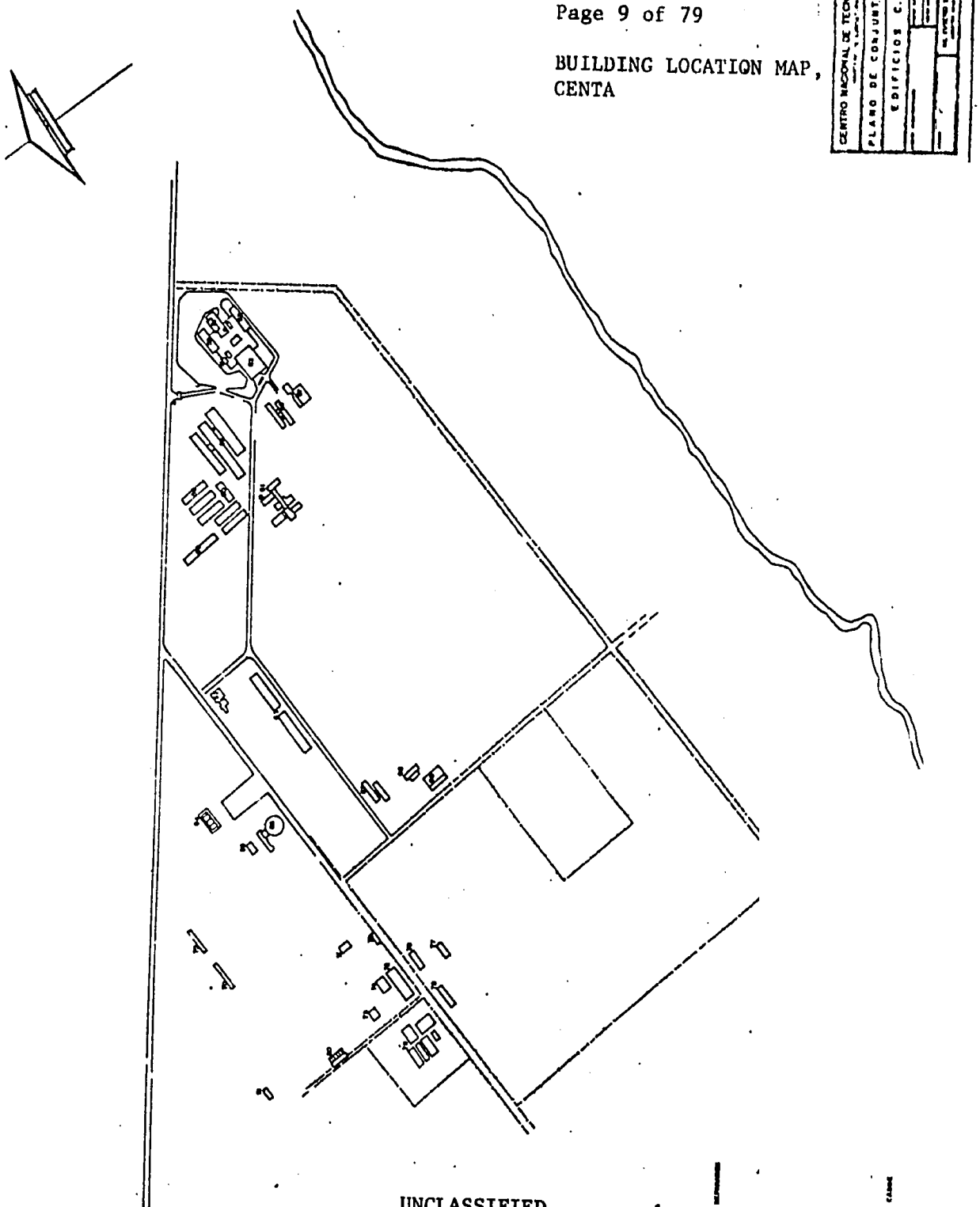
PROJECT CONSTRUCTION TIME SCHEDULE



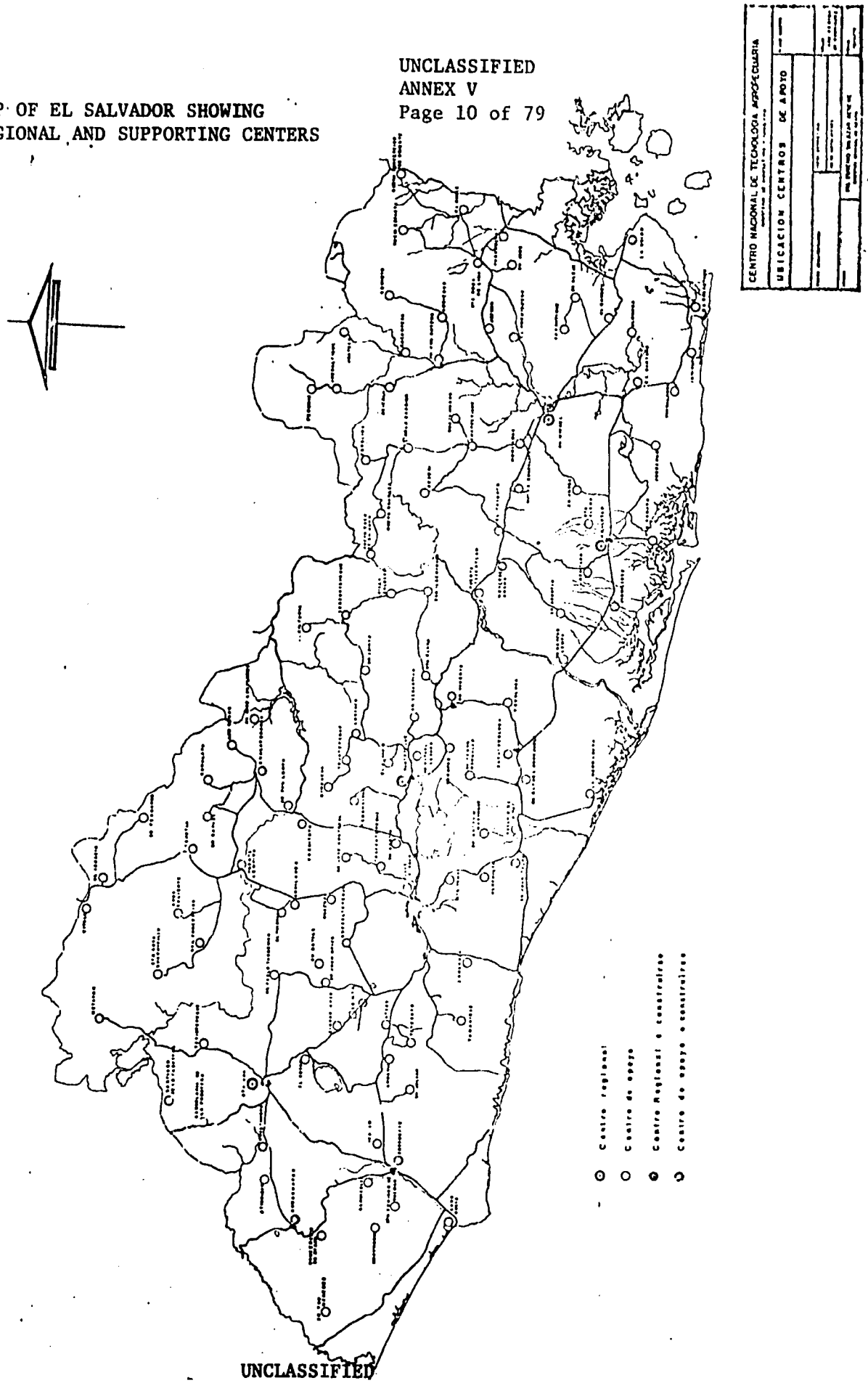
TOPOGRAPHIC MAP, CENTA

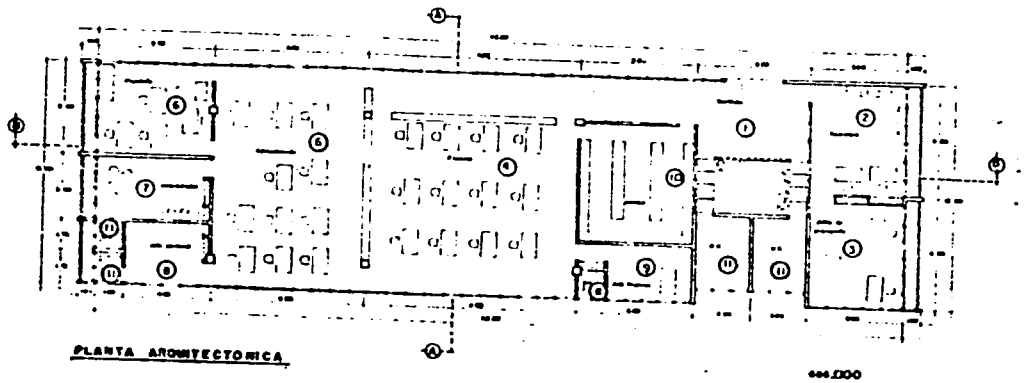


BUILDING LOCATION MAP,
CENTA



MAP OF EL SALVADOR SHOWING
REGIONAL AND SUPPORTING CENTERS

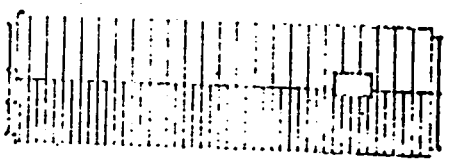




PLANTA ARQUITECTONICA

INDICE

1. Vestibulo
2. Secretaria
3. Jefes de propaganda
4. Finanzas
5. Administración
6. Pagaduria
7. Administrador
8. Jefe Personal
9. Jefe finanzas
10. Archivo
11. W.C.



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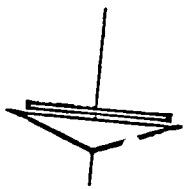
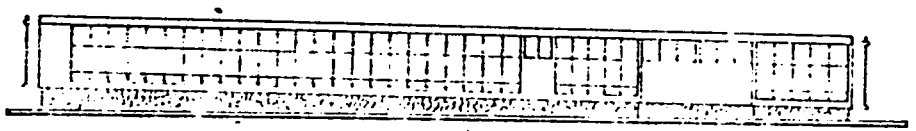
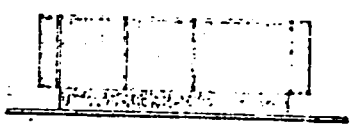




ELEVACION NORTE



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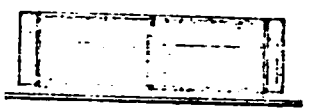

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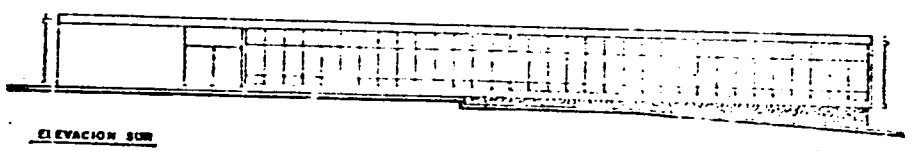
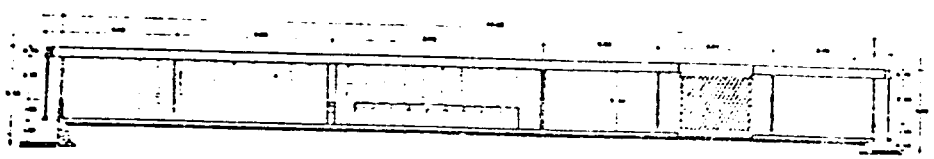
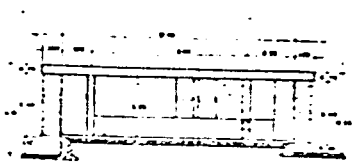


ELEVACION SUR



SECCION B-B



SECCION A-A

ADMINISTRATION BUILDING

UNCLASSIFIED
ANNEX V
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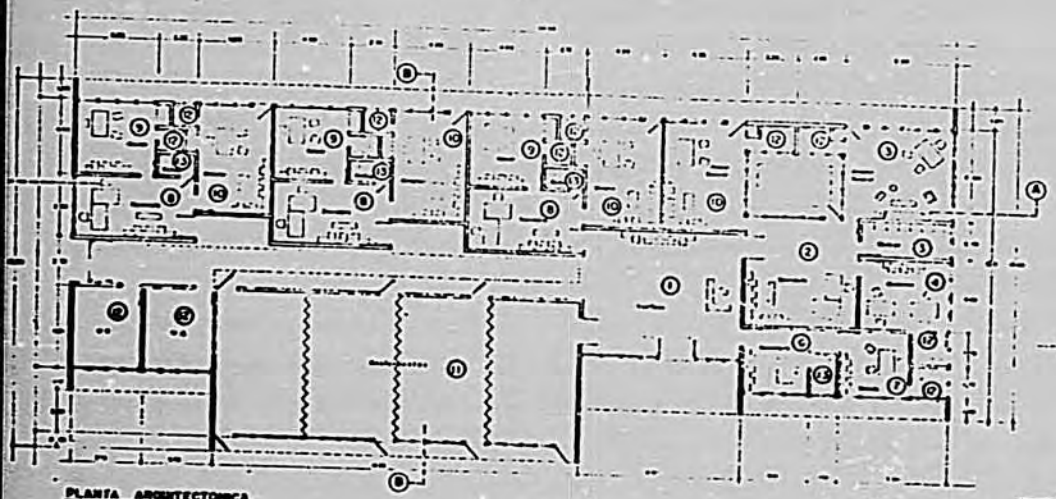
CENTRO NACIONAL DE TECNOLOGIA AGROPECUARIA

EDIFICIO ADMINISTRATIVO

EXECUTIVE BUILDING



PLANTA ARQUITECTONICA

INDICE

① Vestibulo	⑤ Asesor General	⑩ Director
② Secretaria	⑥ Secretaria	⑪ Conferencias
③ Bodega	⑦ Gerente	⑫ S. C
④ Director General	⑧ Secretaria	⑬ Bodega
⑨ Asesores	⑨ Asesor	

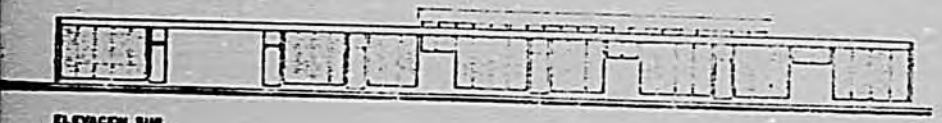
PLANTA DE TECHOS

ELEVACION OESTE

ELEVACION ESTE

ELEVACION NORTE

SECCION A-A



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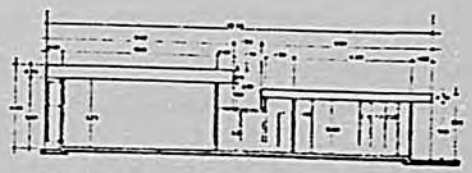


SECCION B-B

CENTRO NACIONAL DE TECNOLOGIA AGROPECUARIA

EDIFICIO EJECUTIVO

PLANTA ARQUITECTONICA, PLANTA DE TECHOS, ELEVACIONES, CORTES

ADMINISTRATION BUILDING

ARTICLE	ARTICLE COST
1. Site Preparation	$ 928.-
2. Foundations, Structural Concrete	7,424.-
3. Masonry	6,496.-
4. Metal Work	5,568.-
5. Roofing & Ceiling	3,712.-
6. Electrical	4,176.-
7. Plumbing, Potable Water, Drainage	5,104.-
8. Carpentry	4,640.-
9. Windows	6,960.-
10. Paint	1,392.-
Total Construction Cost.	$ 46,400.-

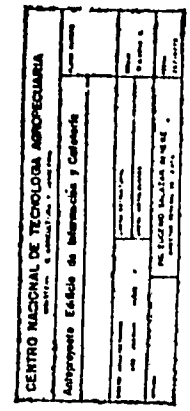
EXECUTIVE BUILDING

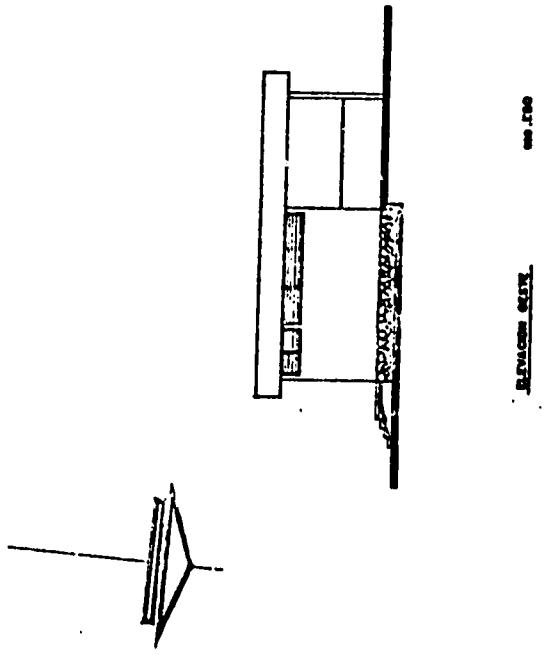
ARTICLE	ARTICLE COST
1. Site Preparation	$ 1,676.-
2. Foundations, Structural Concrete	13,408.-
3. Masonry	11,732.-
4. Metal Work	10,056.-
5. Roofing & Ceiling	6,704.-
6. Electrical	7,542.-
7. Plumbing, Potable Water, Drainage	9,218.-
8. Carpentry	8,380.-
9. Windows	12,570.-
10. Paint	2,514.-
Total Construction Cost.	$ 83,800.-

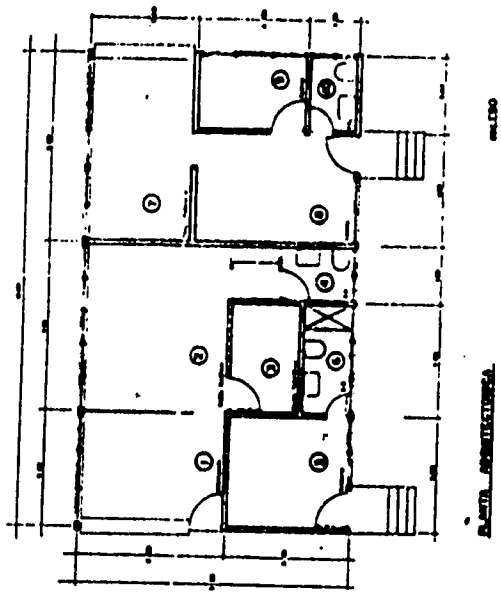
PROPOSED EQUIPMENT FOR THE AGRICULTURAL ECONOMICS AND PLANNING DEPARTMENT FOR SUPERVISION AND EVALUATION OF AGRICULTURAL PROJECTS

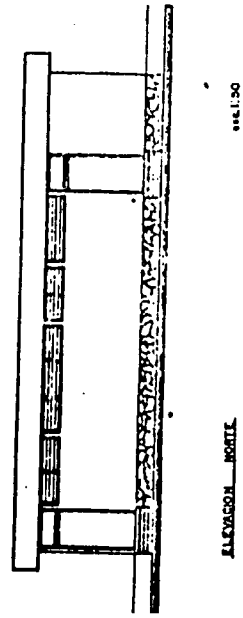
Quantity	Item	Total
1	Electric IBM typewriter with a 23" carriage	$ 982.00
1	Electric IBM typewriter with 16" carriage	844.00
1	Dictaphone Model 2.11 - IBM	691.00
1	Transcriber 2.11 Model IBM	691.00
1	Microfilm camera	4,190.00
1	"Léctor Impresor"	2,100.00
1	Slide projector No. 860, Conference model with remote focus control	410.00
1	Electric calculator with two memory banks	800.00
2	Electric adding machines with two memory banks	1,596.00
1	Calculator with tape	1,600.00
1	Automatic photo-copying machine 3M 209	1,000.00
	Subtotal	$14,904.00
	Miscellaneous	9,096.00
		$24,000.00
10% Insurance & Freight		2,400.00
8% to absorb price increases due to inflation		1,920.00
	Total	$28,320.00

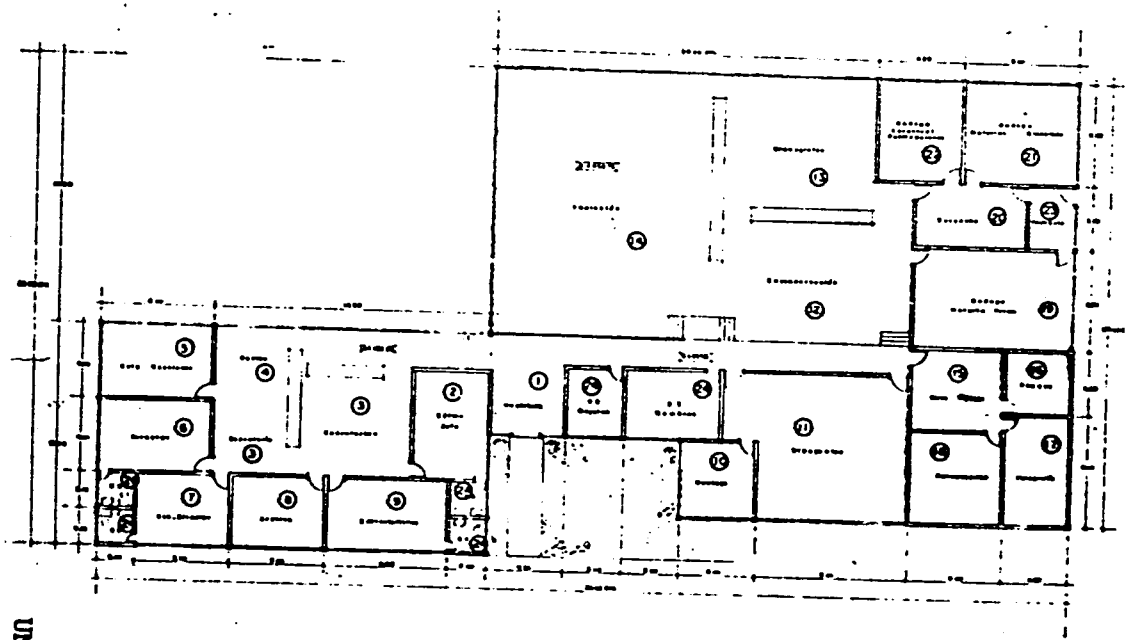
COMMUNICATION CENTER





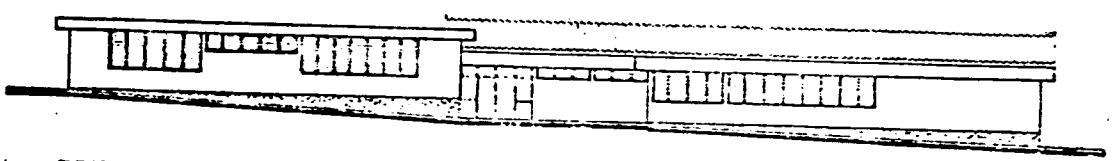






PLANTA ARQUITECTONICA

esc. 1:100



ELEVACION NORTE

esc. 1:100

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2. Editor Jefe
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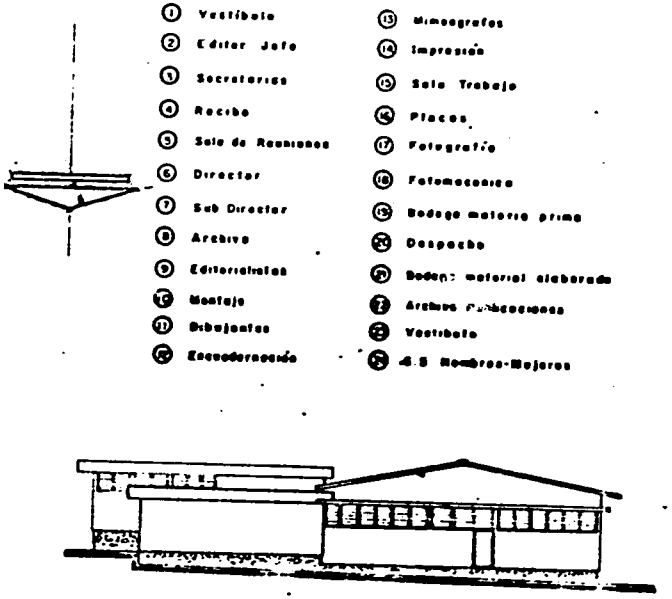
4. Recibo
5. Sala de Reuniones
6. Director
7. Sub Director
8. Archivo
9. Editoriales
10. Montaje
11. Dibujantes
12. Encuadernación
13. Mimeografos
14. Impresión
15. Sala Trabajo
16. Placas
17. Fotografía
18. Fotomecanica
19. Bodega materia prima
20. Despacho
21. Bodega material elaborado
22. Archivo Publicaciones
23. Vestibulo
24. S.S Hombres-Mujeres



ELEVACION OESTE

CENTRO NACIONAL DE TECNOLOGIA AGROPECUARIA

ANTEPROYECTO EDIF. EDITORIAL

UNCLASSIFIED

COMUNICATION CENTER

ARTICLE	ARTICLE COST
1. Site Preparation	$ 138.-
2. Foundations, Structural Concrete	1,104.-
3. Masonry	966.-
4. Metal Work	828.-
5. Roofing & Ceiling	552.-
6. Electrical	621.-
7. Plumbing, Potable Water & Drainage	759.-
8. Carpentry	690.-
9. Windows	1,035.-
10. Paint	207.-
Total Construction Cost.	$ 6,900.-

INFORMATION CENTER

ARTICLE	ARTICLE COST
1. Site Preparation	$ 1,160.-
2. Foundations, Structural Concrete and Floor	9,280.-
3. Masonry	8,120.-
4. Metal Work	6,960.-
5. Roofing & Ceiling	4,640.-
6. Electrical	5,220.-
7. Plumbing, Potable Water, Drainage	6,380.-
8. Carpentry	5,800.-
9. Windows	8,700.-
10. Paint	1,740.-
Total Construction Cost.	$ 58,000.-

PROPOSED COMMUNICATIONS EQUIPMENT FOR COMMUNICATION CENTER

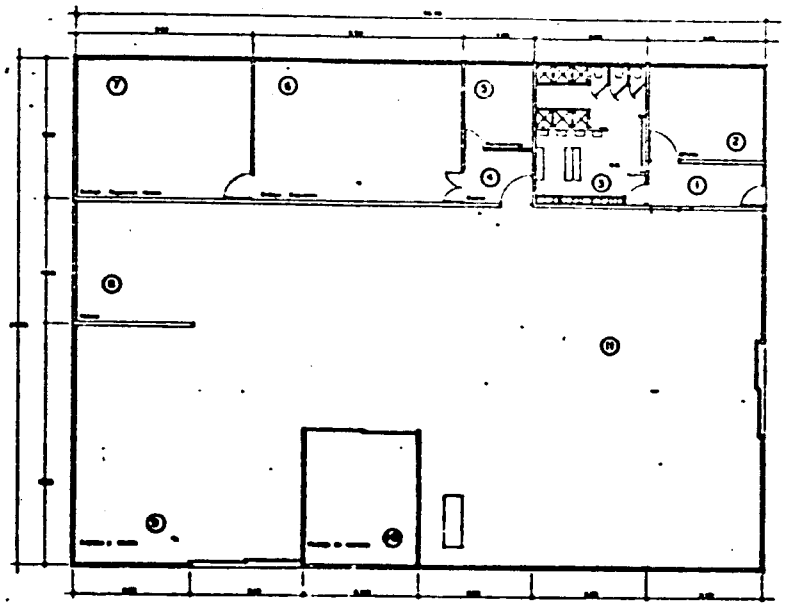
Quantity	Item		Total
	Telephone Switchboard		
15	Trunks		
200	Lines		
25	Internal lines		$18,000.00
10	Director type		7,000.00
200	Telephones		7,000.00
		Subtotal	$32,000.00
10% Insurance & Freight			3,200.00
8% to absorb prices increases due to inflation			2,560.00
		Total	$37,760.00

PROPOSED EQUIPMENT FOR INFORMATION DEPARTMENT

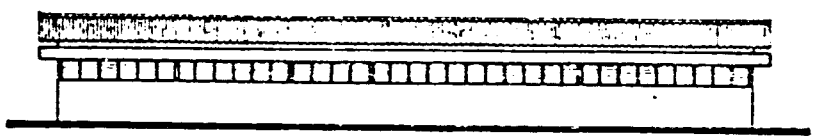
CENTA HEADQUARTERS

Composition Column		
a) Composition machines IBM		$ 9,600.00
b) Console		8,776.00
c) 3 Tape recorders		12,547.00
d) Set of 30 elements		960.00
	Subtotal	$31,883.00
Impression		
a) Printing Press		$32,000.00
b) 1 Stapler - coil type		800.00
c) Cardboard cutting machine		7,200.00
d) Folder		5,600.00
e) Electric mimeograph machine		2,400.00
f) Hand mimeograph machine		1,600.00
g) Printing press - vacuum with arc lighting		5,600.00
h) Hole puncher		800.00
	Subtotal	$56,000.00
Press Department		
Movie camera, Movie projector, photographic cameras, complete set of equipment for retouching negatives, tape recorder.		$16,000.00
Drawing Section		
General Equipment		$ 4,117.00
Photo Lab		
Equipment		$70,000.00
Misc. Equipment		$13,000.00
	Subtotal	$103,117.00
	Subtotal	$191,000.00
10% Insurance & Freight		19,100.00
8% to absorb price increases due to inflation		15,280.00
	Total	$225,380.00

VEHICLE MAINTENANCE SHOP



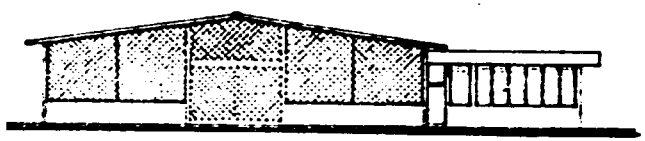
PLANTA ARQUITECTONICA



ELEVACION OESTE

INDICE

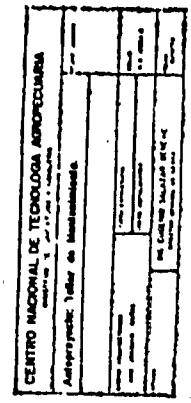
1. Vestibulo
2. Oficina
3. S.S.
4. Control
5. Herramientas
6. Bodega Repuestos
7. Bodega Repuestos Usados
8. Pintura
9. Engrase y lavado
10. Montaje de motores

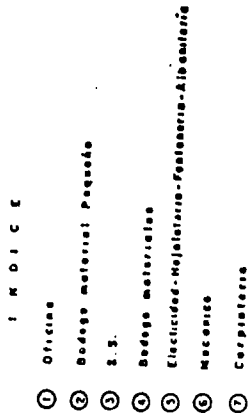


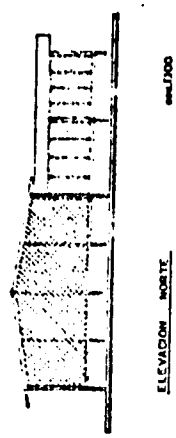
ELEVACION NORTE

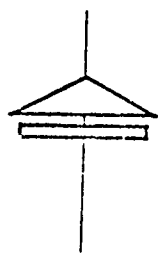
CENTRO NACIONAL DE TECNOLOGIA AGROPECUARIA	
Anteproyecto: Taller de Reparación.	

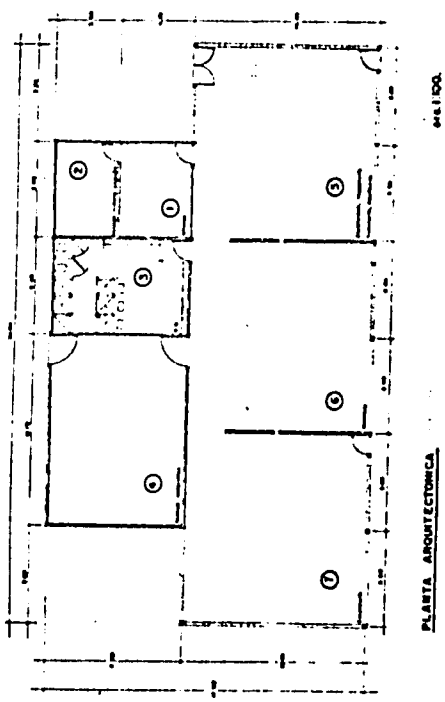
GENERAL SERVICES MAINTENANCE

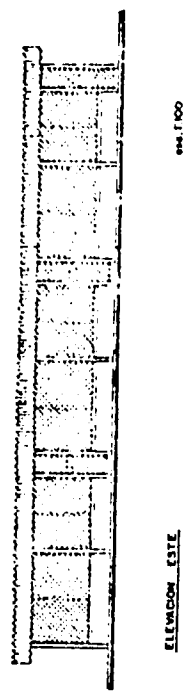












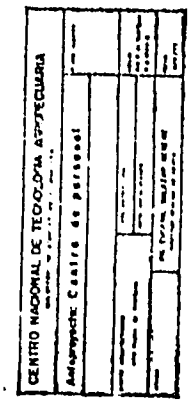
AGRICULTURAL MACHINES AND VEHICLE MAINTENANCE

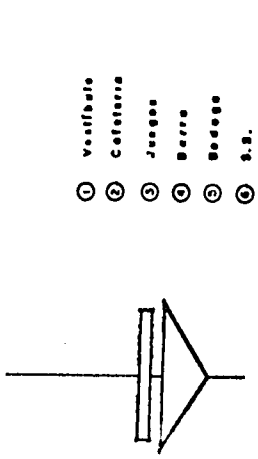
ARTICLE		ARTICLE COST
1.	Site Preparation	$ 1,074.00
2.	Foundations, Structural Concrete and Floor	8,592.00
3.	Masonry	7,518.00
4.	Metal Work	6,444.00
5.	Roofing & Ceiling	4,296.00
6.	Electrical	4,833.00
7.	Plumbing, Potable Water, Drainage	5,907.00
8.	Carpentry	5,370.00
9.	Windows	8,055.00
10.	Paint	1,611.00
	Total Construction Cost	$53,700.00

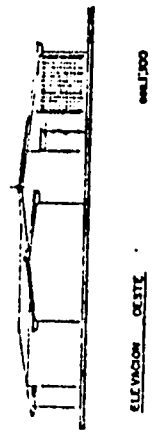
GENERAL SERVICES - MAINTENANCE

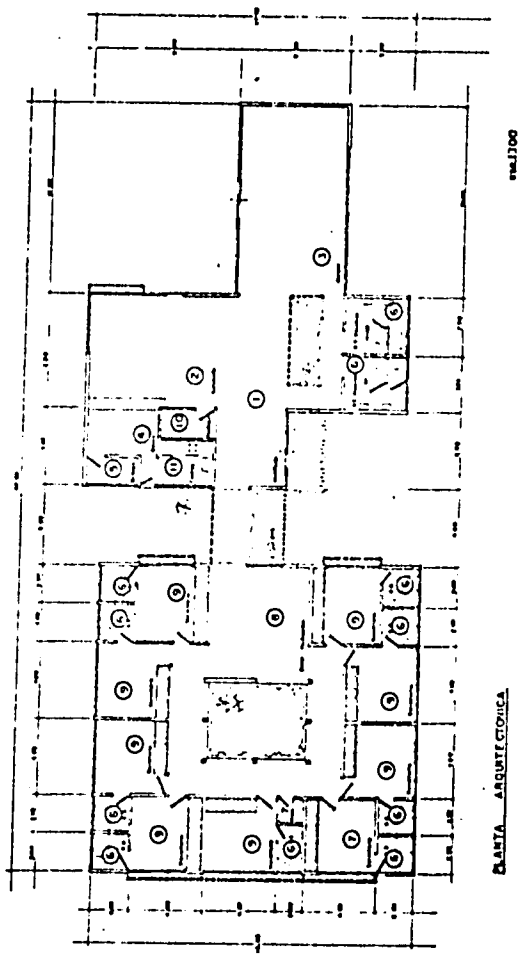
1.	Site Preparation	510.00
2.	Foundations, Structural Concrete and Floor	4,080.00
3.	Masonry	3,570.00
4.	Metal Work	3,060.00
5.	Roofing & Ceiling	2,040.00
6.	Electrical	2,295.00
7.	Plumbing, Potable Water, Drainage	2,805.00
8.	Miscellaneous	2,550.00
9.	Potable Water System	3,825.00
10.	Sewage and Drainage	765.00
	Total Construction Cost	$ 25,500.00

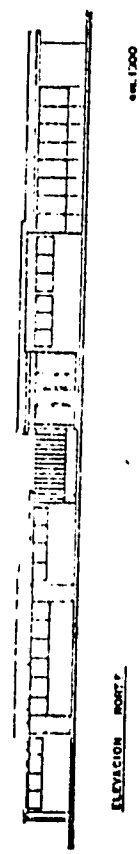
SHORT TERM TECHNICIAN'S QUARTERS











PLANT SCIENCE BUILDING

PLANTA ARQUITECTONICA

ELEVACION SUR

1. Vestibulo
2. Secretaria
3. Secretarias
4. Jefe
5. S.S.
6. Archivo
7. S S
8. Oficina Investigadores
9. Bodega
10. Laboratorio Botanica
11. Herbario
12. Cubiculos
13. Muestras
14. Fenologia
15. Laboratorio Genetica
16. Laboratorio Semilla
17. Banco de Germoplasma
18. Banco Semilla Certificada
19. Seleccion de Semilla
20. Laboratorio de Algodon
21. Colecciones
22. Entomologia
23. Camara de Control
24. Laboratorio Nematologia
25. Investigacion
26. Cuarto de Transformacion

CENTRO NACIONAL DE TECNOLOGIA AGROPECUARIA	
ANTEPROYECTO EDIF. FITOTECNIA	

UNCLASSIFIED

SHORT TERM TECHNICIAN's QUARTERS

ARTICLE	ARTICLE COST
1. Site Preparation	$ 850.-
2. Foundations, Structural Concrete and Floor	6,800.-
3. Masonry	5,950.-
4. Metal Work	5,100.-
5. Roofing & Ceiling	3,400.-
6. Electrical	3,825.-
7. Plumbing, Potable Water, Drainage	4,675.-
8. Carpentry	4,250.-
9. Windows	6,375.-
10. Paint	1,275.-
Total Construction Cost.	$ 42,500.-

PLANT SCIENCE BUILDING

ARTICLE	ARTICLE COST
1. Site Preparation	$ 8,096.-
2. Foundations, Structural Concrete and Floor	64,768.-
3. Masonry	56,672.-
4. Metal Work	48,576.-
5. Roofing & Ceiling	32,384.-
6. Electrical	36,432.-
7. Plumbing, Potable Water, Drainage	44,528.-
8. Carpentry	40,480.-
9. Windows	60,720.-
10. Paint	12,144.-
Total Construction Cost.	$ 404,800.-

PROPOSED EQUIPMENT FOR THE DEPARTMENTS OF PLANT SCIENCE AND PLANT PARASITOLOGY

Quantity	Item	Total
2	Compound Microscope	$ 2,024.00
3	Dehydrators	76.00
1	Electric calculator	640.00
4	Nemoticide injector	192.00
4	Porcelain Plates for dehydrators	10.80
25	Bacteriologic filters	100.00
1	Blender	60.00
4	Pumps	880.00
8	Manual pumps, 4 gallon capacity	416.00
1	Centrifuge, 200 rpm	676.00
8	Centrifuge tubes	166.00
1	Refrigerator, 14 c.f.	520.00
1	Air conditioning unit with dehumidifier, 75 M3 capacity	400.00
1	Analytical Balance	800.00
1	Kodak slide projector, Carrousel 800	320.00
1	Micromanipulator Emersson	700.00
2	Cabinets for Insect Collection	220.00
15	Magnifying Glasses, 20X	262.40
15	Surgery Sets	422.80
2	Drillers for Triangles	22.00
2	Forceps for insect setting	39.00
4	Palines	18.00
1	Insect Dehydrator	366.00
4	Black Light Lamps, 15 watts	120.00
1	Nikkon, Photographic Equipment	1,000.00
4	Hydrothermograph	640.00
1	"Microvaid" transfer chamber	400.00
1	Orbital Agitator Lab-Line, level plant form	180.00
1	Controlled Environment Chamber	1,000.00
1	Electric juice extractor	28.00
1	Hand operated refractometer	40.00
5	Clock type scales	170.00
2	Gram and kilogram scales, 5 Kg. capacity	200.00
4	Coupled motor pumps, 30 gallons capacity	4,000.00
2	"Solo" pump, 3 gallon capacity	400.00
2	Motor pumps for fumigation	200.00
1	Small tractor with mower and cultivator	2,800.00

Quantity	Item	Total
1	Tractor mower	320.00
2	Underground fumigation applicators	80.00
3	Clock type scales	102.00
1	Injector of underground fumigant	40.00
5	Metile Bromide applicator	50.00
	Communication system to link regional experiment stations	10,440.00
4	Comptometer	640.00
1	Presley Apparatus	1,200.00
1	Stelómetro	1,200.00
1	Micronaire	1,200.00
1	Small electric ginning, saw type	4,000.00
1	Tractor	4,400.00
1	Harrow	960.00
1	Trailer, 5 ton capacity	1,040.00
1	Rotary cutter, 540 rpm	1,000.00
1	Sprayer pump for tractor	440.00
25	Pumps, Knapsack type	1,000.00
1	Spray irrigation equipment	2,800.00
1	Deep well pump, 100 gallon per minute	4,000.00
1	Seed drill with fertilizer attachment for cereal grains	800.00
20	"Planet Junior" cultivators with tillage tools	1,200.00
20	"Planet Junior" Seed driller, with disks for seeding	1,200.00
20	Dusters	400.00
20	Sprayers	640.00
5	Motor pumps for the application of powder and liquid pesticide	600.00
1	Moisture tester "Steinlite", Mod. 500 RGT	600.00
4	Manual Corn sheller	480.00
2	Rice and sorghum power thresher	1,600.00
2	Rice harvesters, gasoline motor	480.00
2	Rotary cutter for grease tests	800.00
1	Camera	400.00
10	Clock type scale, 30 Kg. capacity	160.00

Quantity	Item		Total
2	Graded gram scales		240.00
1	Calculator		800.00
1	Electronic calculator		1,600.00
1	Seed processing plant		60,000.00
		Subtotal	$127,421.00
10% Insurance and Freight			12,742.00
8% to absorb price increases			10,193.00
		Total	$150,356.00

PLANTA ARQUITECTONICA

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ELEVACION NORTE

esc. 1:200

ELEVACION ORIENTE

CHEMISTRY BUILDING

INDICE

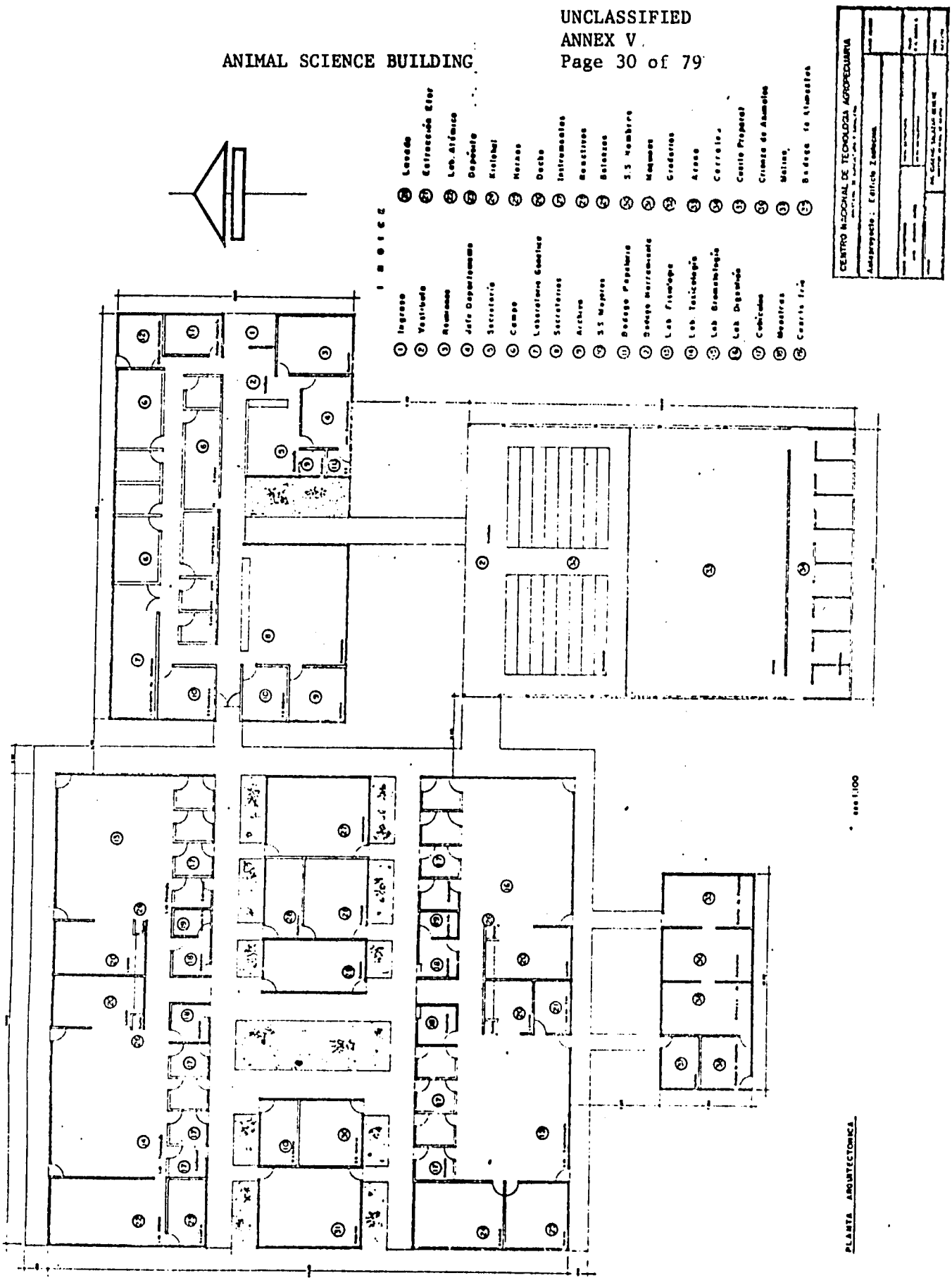
1 Oficina Jefe
2 Secretarias Jefes
3 Secretaria General
4 Sala de dibujo
5 Personal de campo
6 Vestibulo
7 Archivos
8 Servicios sanitarios
9 Cubiculos
10 Laboratorio de Quimica
11 Bascula instrumental
12 Cuarto para muestras
13 Laboratorios de Suelos
14 Recibidor y Archivo de muestras
15 Secado de muestras
16 Molido y Tamizado
17 Camara de gases
18 Lavado
19 Bodegas de reactivos
20 Cuarto de pesas
21 Bascula instrumental
22 Fotometro de llama
23 Aparato de absorcion atomica
24 Muflas
25 Kjeldahl
26 Area de lavado y ducha
27 Laboratorios de insecticidas y fertilizantes
28 Bodega
29 Laboratorio de Quimica Agricola
30 Cuarto de muestras
31 Picado y molido
32 Horno
33 Cuarto de maquinas

CENTRO NACIONAL DE TECNOLOGIA AGROPECUARIA

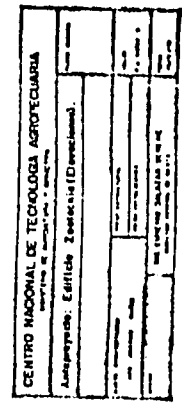
ANTEPROYECTO EDIFICIO QUIMICA

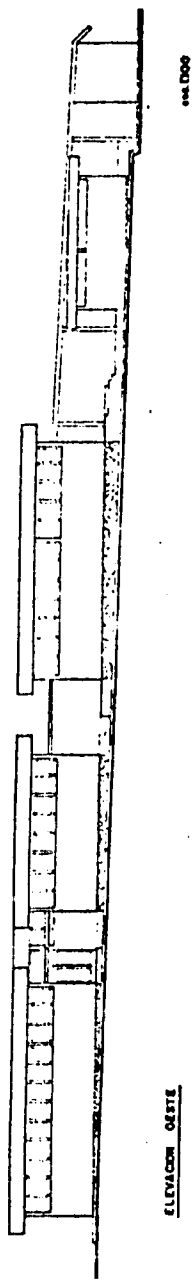
PLANTA ARQUITECTONICA

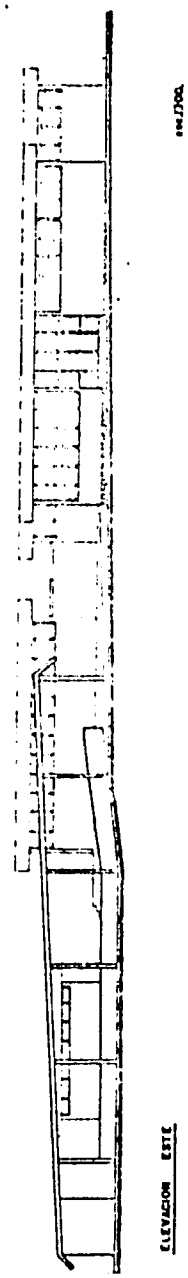
ANIMAL SCIENCE BUILDING



ANIMAL SCIENCE BUILDING ELEVATIONS







CHEMISTRY BUILDING

ARTICLE		ARTICLE COST
1.	Site Preparation	$ 5,130.-
2.	Foundations, Structural Concrete and Floor	41,040.-
3.	Masonry	35,910.-
4.	Metal Work	30,780.-
5.	Roofing & Ceiling	20,520.-
6.	Electrical	23,085.-
7.	Plumbing, Potable Water, Drainage	28,215.-
8.	Carpentry	25,650.-
9.	Windows	38,475.-
10.	Paint	7,695.-
	Total Construction Cost.	$ 256,500.-

ANIMAL SCIENCE BUILDING

ARTICLE		ARTICLE COST
1.	Site Preparation	$ 5,634.-
2.	Foundations, Structural Concrete and Floor	45,072.-
3.	Masonry	39,438.-
4.	Metal Work	33,804.-
5.	Roofing & Ceiling	22,536.-
6.	Electrical	25,353.-
7.	Plumbing, Potable Water, Drainage	30,987.-
8.	Carpentry	28,170.-
9.	Windows	42,255.-
10.	Paint	8,451.-
	Total Construction Cost.	$ 281,700.-

PROPOSED EQUIPMENT FOR CHEMISTRY AND SOILS BUILDING

Agricultural Chemistry

Quantity	Item	Total
1	Water still & demineralizer	$ 10,000.00
4	Apparatus for crude fiber determination of 6 units each	3,520.00
50	Filter units, Oklahoma system	2,000.00
4	Sets fat extractors of 6 units each	2,400.00
2	Microkjeldhal sets with digestion racks of 6 units each	500.00
4	Electric analytic scales	4,800.00
4	Electric muffle furnaces	3,200.00
4	Refrigerators	2,000.00
4	Stoves, induced hot air type	4,000.00
4	Vacuum stoves	1,600.00
6	Ordinary stoves	2,400.00
1	Flame photometer	1,000.00
4	Potentiometers	1,600.00
6	Steam baths	1,800.00
4	Ultrasonic cleaning sets	1,600.00
1	Large hammer mill	1,000.00
2	Small hammer mills	800.00
2	Color meters	2,000.00
6	Hot plates, large	600.00
2	Polarimeters complete with accessories	6,000.00
2	Vacuum pumps	2,000.00
3	Mechanical agitators	1,800.00
6	Gas chambers	18,000.00
10	Air extractors (pumps)	4,800.00
6	Air conditioning units	2,880.00
1	Autoclave	2,000.00
1	Stereoscopic microscope	1,200.00
2	Microscopes with photographic cameras	2,000.00
6	Blenders with 4 spare glasses each	600.00
6	Automatic pipette washers	708.00
1	Digital printer for atomic absorption	3,000.00
1	Thermal detector unit	500.00
1	Water pump	2,000.00
1	Air pump	2,000.00
1	Tester for maintenance of equipment	160.00
1	Cold room for storing reactives & samples	600.00
10	Lamps for subtitling	400.00
1	Torsion scale	640.00
1	Micro-balance	1,000.00
2	Centrifuges	4,000.00

TABLE 9E (cont'd).

5	tables for analytic balance	2,000
1	amalgamator wig-LBug	1,000
1	electrophoresis chamber	800
20	hollow cathode lamps for atomic absorption	2,800
1	Burrmill	400
1	unit for determining amino-acids	1,200
3	electric analytic balance, 1000 gm. capacity	4,800
2	electric balance Capacity 2,000 gr.	2,000
2	torsion balances	600
3	electric steam baths	1,800
1	centrifuge	1,200
6	electric agitators for tubes	600
1	electro muffle	3,000
12	gas regulator valves	720
12	electric hot plates of invisible resistance	600
6	large electric hot plates of invisible resistance	1,800
3	electric stoves	3,000
6	automatic pipette washers	600
6	vacuum pumps	1,800
2	sets of sieves and vibrators	2,800
18	electric mixers	1,080
2	spectronic colorimeters	2,800
6	adjustable swivel chairs	400
6	cabinet dryers	1,080
.	Kjeldahl digestion and distillation apparatus, 18 unit	7,200
1	gas chamber	800
2	electric conductivity bridges with cells	800
1	water still	2,000
1	refrigerator	800
1	flame photometer	2,000
12	soil sampling tubes	200
1	automatic balance - 500 grams capacity	600
12	voltage regulators	1,000
3	ventilators, air	120
6	Titration lamps	300
1	electric calculator with IC Compet CS-361R Sharp	800
1	vacuum machine, brand NucAr to use in contacts of negatives, positives and test in color	2,000
		$ 160,608
	10% Insurance & Freight	16,061
	8% to absorb price increases due to inflation	12,848
		$ 189,517.00

TABLE 10E

PROPOSED EQUIPMENT FOR THE ANIMAL SCIENCE BUILDING

Items	Quantity	Unit Price	Total $
Refrigerators	2	685	1,370
Freezers	2	500	1,000
Fume Hoods	4	765	3,060
Microscopes			
a. Teaching scopes	10	216	2,160
b. Steroscopic dissection scopes	2	490	980
c. Binocular research microscopes	4	1,013	4,052
pH Meters	2	650	1,300
Colorimeters-Spectronic 20	2	495	990
Kjeldahl apparatus	2	900	1,800
Metabolic Shaker	1	800	800
Water baths	4	500	2,000
Sand bath	2	150	300
Muffler furnace	1	900	900
Fiber digestion apparatus	1	880	880
Forced air drying ovens	4	1,035	4,140
Water distillation apparatus	2	465	930
Deionized water apparatus	2	195	390
Glass distillation apparatus for organic solvents (minimum of 5 liter capacity)	1	800	800
Vortex mixers	8	300	2,400
Refrigerated centrifuges 7,000 RPM 30°C	2	3,085	6,170
Non-refrigerated centrifuges	2	1,125	2,250
Wiley Mill	1	600	600
Blenders	5	200	1,000
Balances meter 200 g capacity	2	1,295	2,590
Pan Balancer	4	790	3,160
Autopsy table	1	3,000	3,000
Triple compartment stainless steel sinks	2	200	400
Powerstats	4	98	391
Calculators	2	1,500	3,000
Autoclave	1	616	616
Theristemp temperature controller	2	250	500
Microtome	1	1,035	1,035

TABLE 10 E (Cont'd)

Miscellaneous equipment	2,200
SUBTOTAL	57,164
Expected price increase 8%	4,573
Insurance and freight (10%)	5,716
GRAND TOTAL	$ 67,453

SOCIAL SCIENCE BUILDING

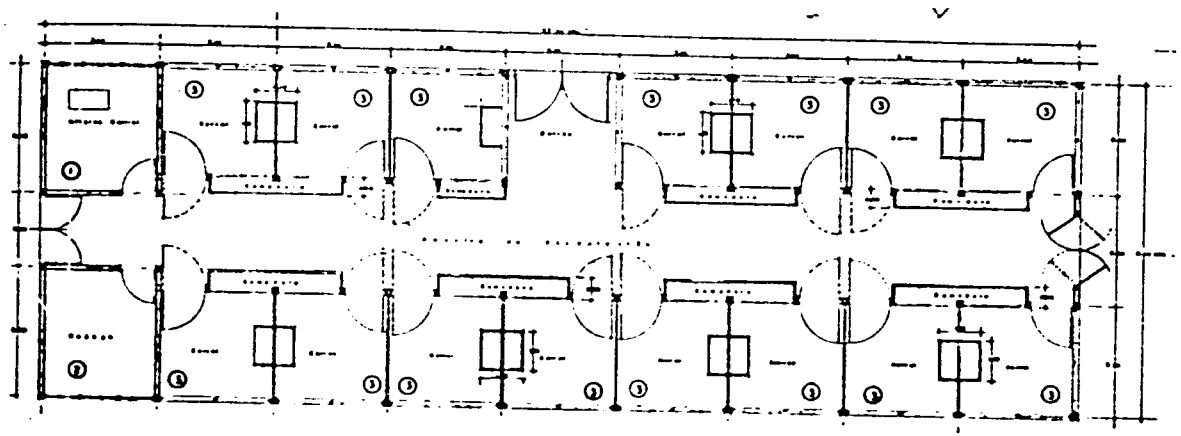
PLANTA ARQUITECTONICA

ELEVACION ESTE

ELEVACION SUR

CENTRO NACIONAL DE TECNOLOGIA AGROPECUARIA	
Anteproyecto: Ciencias Sociales	

MILKING STABLE



PLANTA ARQUITECTONICA

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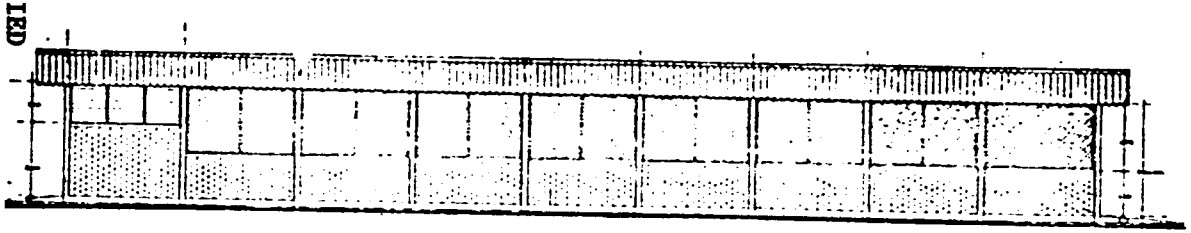
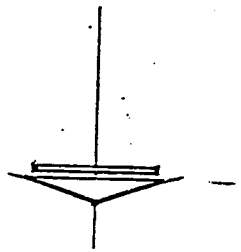


FACHADA NORTE

esc.1:50



① Oficina Control
② Bodega
③ Corral

COW. STABLE

ANNEX. V Page 38 of 79

CENTRO NACIONAL DE TECNOLOGIA AGROPECUARIA	
ESTABLO DE GANADO LECHE	
PLANTA ARQUITECTONICA Y FACHADA	

SOCIAL SCIENCE BUILDING

ARTICLE		ARTICLE COST
1.	Site Preparation	$ 2,116.-
2.	Foundations, Structural Concrete and Floor	16,928.-
3.	Masonry	14,812.-
4.	Metal Work	12,696.-
5.	Roofing & Ceiling	8,464.-
6.	Electrical	9,522.-
7.	Plumbing, Potable Water, Drainage	11,638.-
8.	Carpentry	10,580.-
9.	Windows	15,870.-
10.	Paint	3,174.-
	Total Construction Cost.	$ 105,800.-

COW STABLE

ARTICLE		ARTICLE COST
1.	Site Preparation	$ 322.-
2.	Foundations, Structural Concrete and Floor	4,025.-
3.	Masonry	4,508.-
4.	Metal Work	1,932.-
5.	Roofing & Ceiling	1,449.-
6.	Electrical	1,771.-
7.	Plumbing, Potable Water, Drainage	1,610.-
8.	Carpentry	-
9.	Windows	-
10.	Paint	483.-
	Total Construction Cost.	$ 16,100.-

TABLE 11E

PROPOSED EQUIPMENT FOR AGRICULTURAL EDUCATION AND SOCIAL SCIENCES

	AGRICULTURAL ECONOMICS	COST $
2	Calculators with 2 memory banks	2,000
4	Standard Calculators	3,200
4	filing cabinets	400
1	IBM typewriter 23"	982
1	IBM typewriter 16"	844
	AGRICULTURAL EDUCATION AND SOCIAL SCIENCES	
8	Calculators	8,000
	Audio-visual aids demonstration equipment for specialists and for 4-C Home Economics	4,000
1	Range or stove	500
3	Kitchen equipment	600
3	Blendors	180
3	Mixers	180
10	Irons	200
1	Refrigerator	500
	Other utensils	100
	Veterinary equipment	2,000
1	Mimeograph	800
	Drawing equipment	400
	Misc.	2,114
	SUBTOTAL	28,000
	10% Insurance & Freight	2,800
	8% To absorb increases in price due to inflation	2,240.
	TOTAL	$33,040.

PLANTA ARQUITECTONICA

esc. 1:100

INDICE

① Comederos

② Pilas

SECCION A—A

esc. 1:50

FACHADA PRINCIPAL

esc. 1:100

SECCION B—B

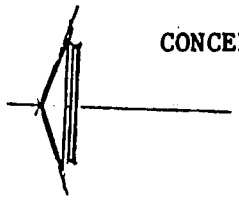
esc. 1:50

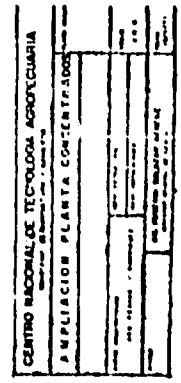
CENTRO NACIONAL DE TECNOLOGIA AGROPECUARIA

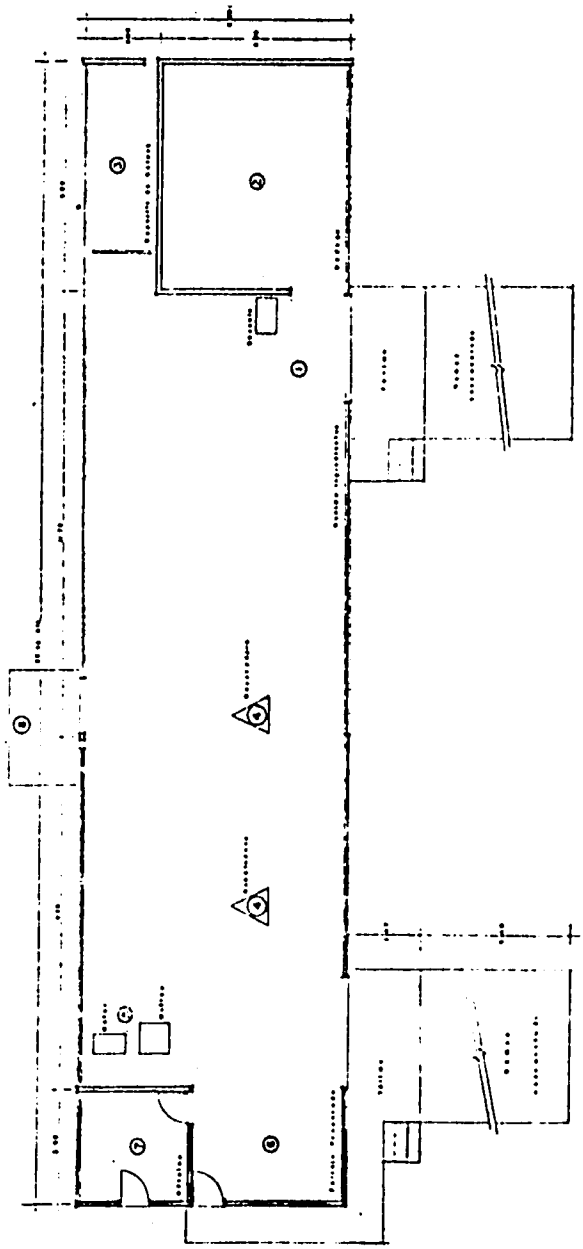
AREA DE DESCANSO Y COMEDERO
GANADO DE LECHE

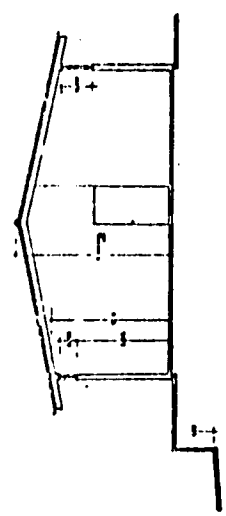
PLANTA ARQ., FACHADA Y CORTES

CONCENTRATES, MIXING









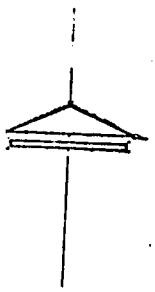
CORRALS, FEEDING & RESTING

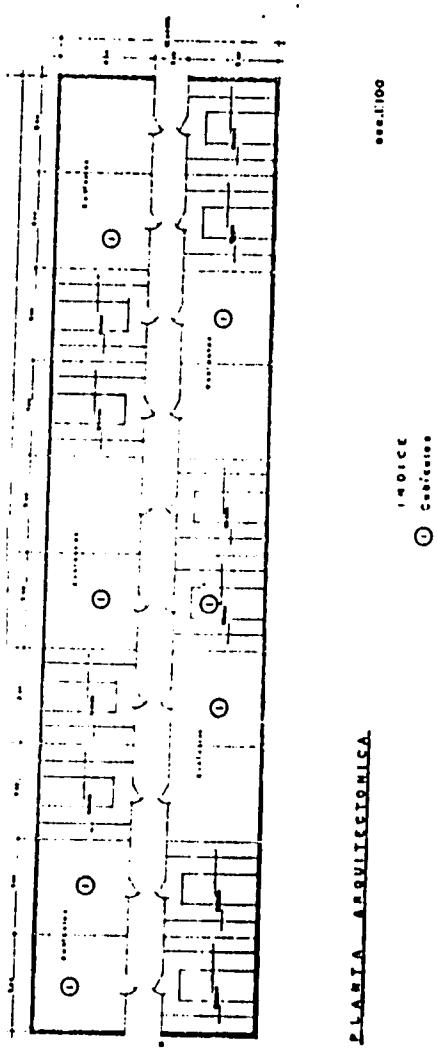
ARTICLE		ARTICLE COST
1.	Site Preparation	$ 624.-
2.	Foundations, Structural Concrete and Floor	7,800.-
3.	Masonry	8,736.-
4.	Metal Work	3,744.-
5.	Roofing & Ceiling	2,808.-
6.	Electrical	3,432.-
7.	Plumbing, Potable Water, Drainage	3,120.-
8.	Carpentry	-
9.	Windows	-
10.	Paing	936.-
	Total Construction Cost.	$ 31,200.-

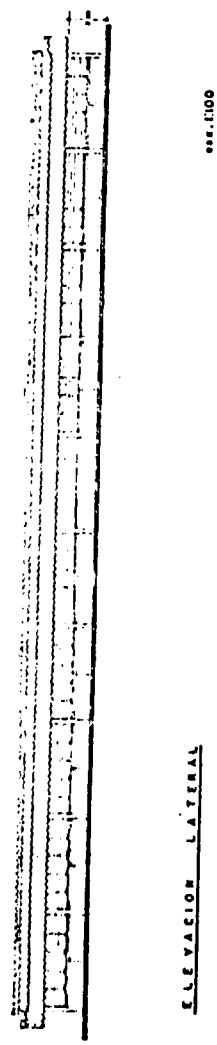
CONCENTRATES, MIXING

ARTICLE		ARTICLE COST
1.	Site Preparation	$ 170.-
2.	Foundations, Structural Concrete and Floor	2,125.-
3.	Masonry	2,380.-
4.	Metal Work	1,020.-
5.	Roofing & Ceiling	765.-
6.	Electrical	935.-
7.	Plumbing, Potable Water, Drainage	850.-
8.	Carpentry	-
9.	Windows	-
10.	Paint	255.-
	Total Construction Cost.	$ 8,500.-

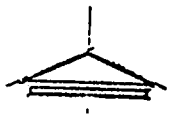
GREEN HOUSE

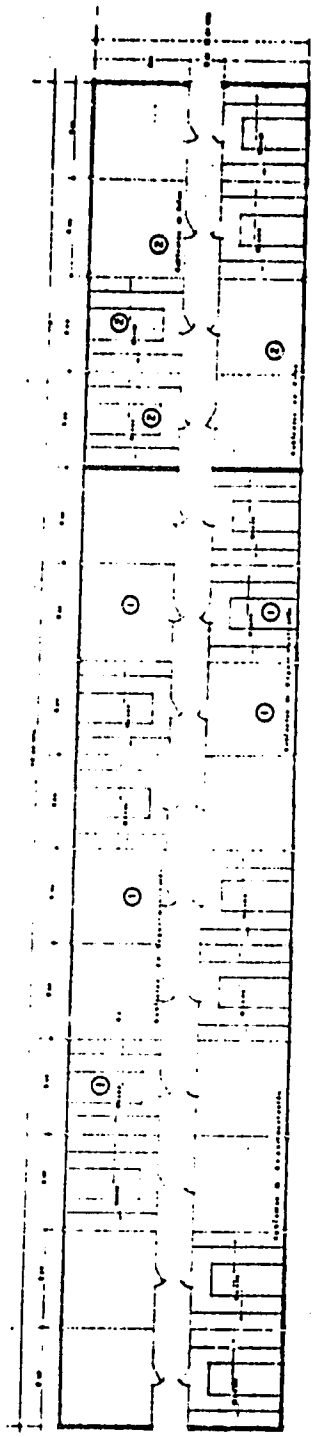


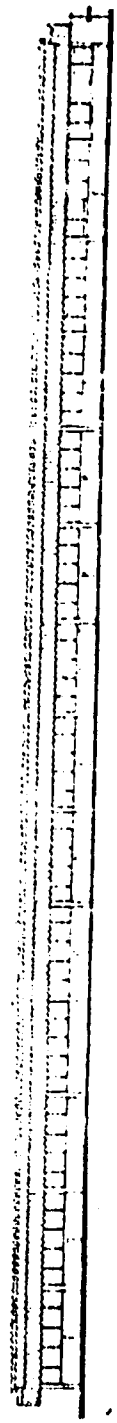


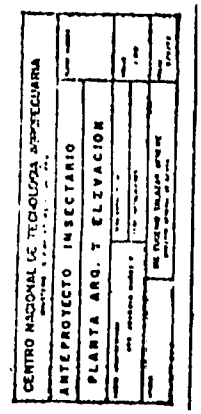


INSECTARY








CENTRO NACIONAL DE TECNOLOGIA AGROPECUARIA
ANTEPROYECTO INSECTARIO
PLANTA ARQ. Y ELEVACION

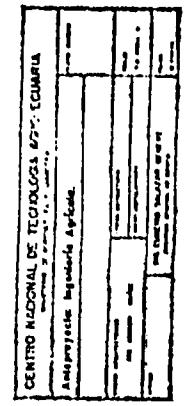
GREEN HOUSES, 5 UNITS

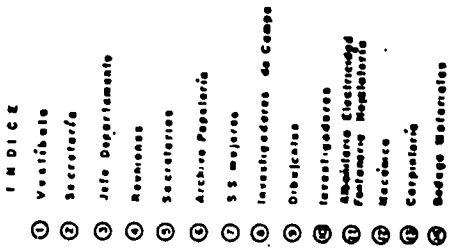
ARTICLE		ARTICLE COST
1.	Site Preparation	$ 5,520.-
2.	Foundations, Structural Concrete and Floor	69,000.-
3.	Masonry	77,280.-
4.	Metal Work	33,120.-
5.	Roofing & Ceiling	24,840.-
6.	Electrical	30,360.-
7.	Plumbing, Potable Water, Drainage	27,600.-
8.	Carpentry	-
9.	Windows	-
10.	Paint	8,280.-
	Total Construction Cost.	$ 276,000.-

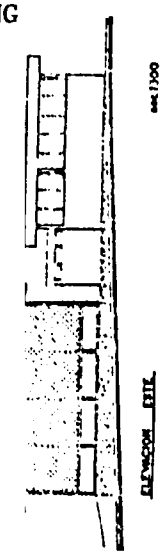
INSECTARY

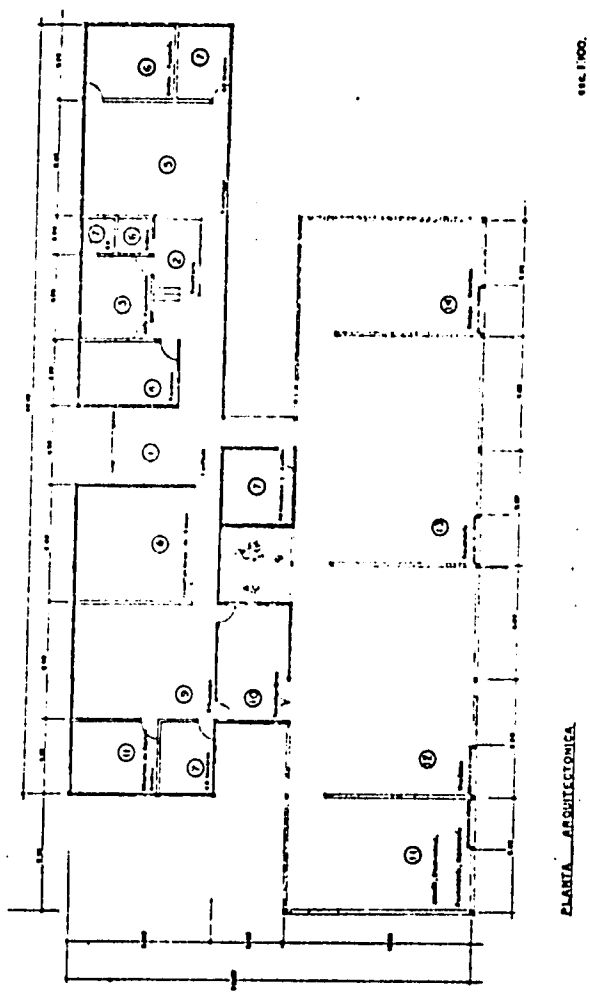
ARTICLE		ARTICLE COST
1.	Site Preparation	$ 1,544.-
2.	Foundations, Structural Concrete and Floor	19,300.-
3.	Masonry	21,616.-
4.	Metal Work	9,264.-
5.	Roofing & Ceiling	6,948.-
6.	Electrical	8,492.-
7.	Plumbing, Potable Water Drainage	7,720.-
8.	Carpentry	-
9.	Windows	-
10.	Paint	2,316.-
	Total Construction Cost.	$ 77,200.-

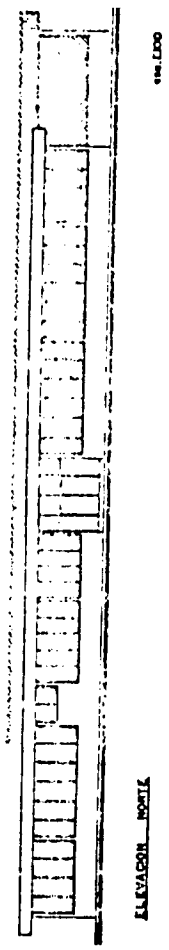
AGRICULTURAL ENGINEERING BUILDING











STABLE

PLANTA ARQUITECTONICA

ELEVACION LATERAL

INDICE

1 Corral
2 Comederos
3 Pilas

ELEVACION FRONTAL

"BULL'S STABLE"

CENTRO NACIONAL DE TECNOLOGIA AGROPECUARIA

Anteproyecto: Establo de Toro

AGRICULTURAL ENGINEERING

ARTICLE		ARTICLE COST
1.	SITE PREPARATION	$ 994.-
2.	FOUNDATIONS, STRUCTURAL CONCRETE AND FLOOR	7,952.-
3.	MASONRY	6,958.-
4.	METAL WORK	5,964.-
5.	ROOFING & CEILING	3,976.-
6.	ELECTRICAL	4,473.-
7.	PLUMBING, POTABLE WATER, DRAINAGE	5,467.-
8.	CARPENTRY	4,970.-
9.	WINDOWS	7,455.-
10.	PAINT	1,491.-
	TOTAL CONSTRUCTION COST.	$ 49,700.-

BULL'S STABLE

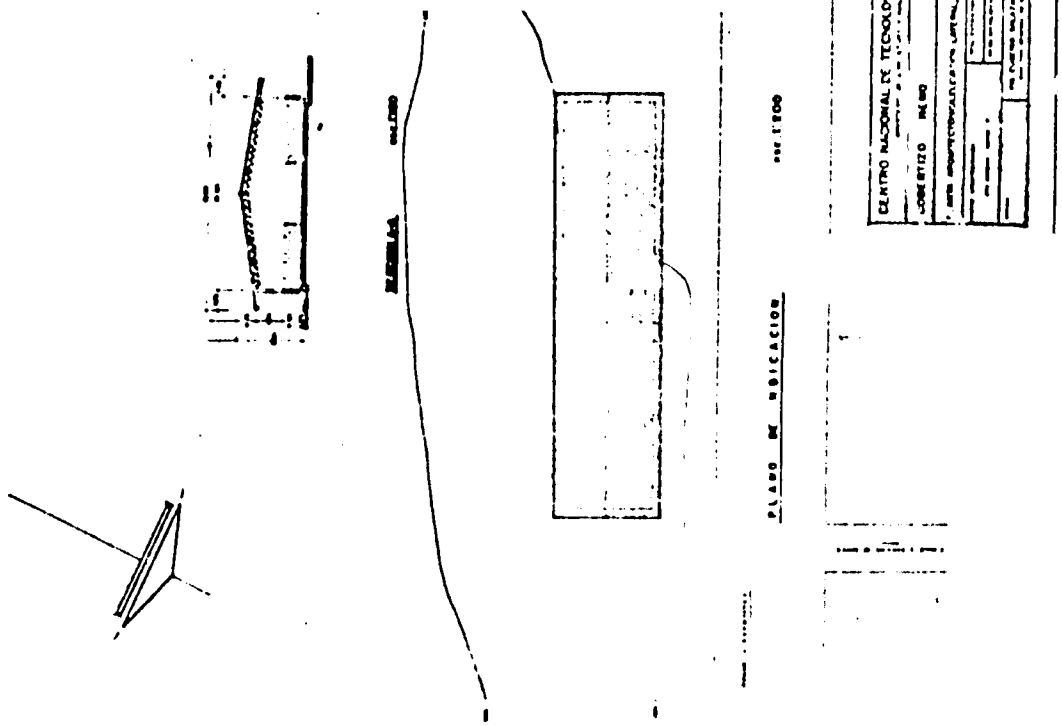
ARTICLE		ARTICLE COST
1.	SITE PREPARATION	$ 368.-
2.	FOUNDATIONS, STRUCTURAL CONCRETE AND FLOOR	4,600.-
3.	MASONRY	5,152.-
4.	METAL WORK	2,208.-
5.	ROOFING & CEILING	1,656.-
6.	ELECTRICAL	2,024.-
7.	PLUMBING, POTABLE WATER, DRAINAGE	1,840.-
8.	CARPENTRY	-
9.	WINDOWS	-
10.	PAINT	552.-
	TOTAL CONSTRUCTION COST.	$ 18,400.-

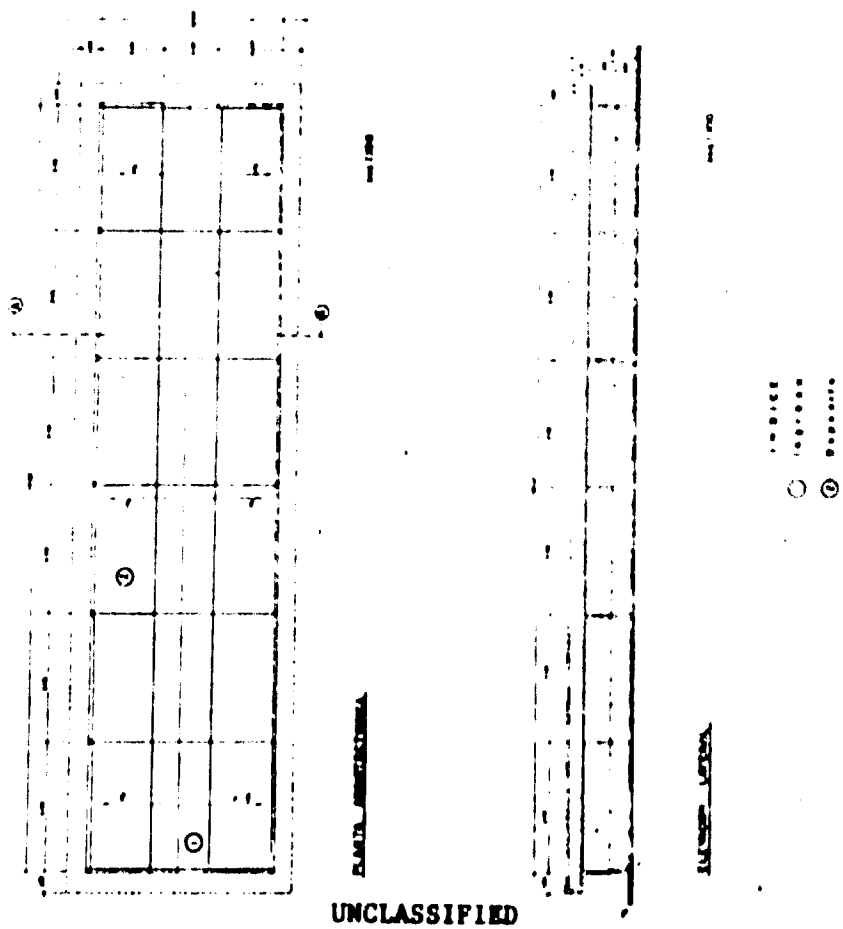
TABLE No. 17E

PROPOSED EQUIPMENT FOR THE AGRICULTURAL ENGINEERING DEPARTMENT

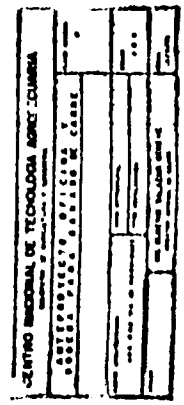
	COST $
2 levels with their respective leveling Rod	1,200
1 Transit	1,200
1 Milling Machine	3,200
2 Bench drills	800
4 Manual drill (hand)	160
4 Large tractors 50 HP with implements	32,000
2 Irrigation pumps	20,000
2 Sprinkler irrigation systems	12,000
4 Tractors under 50 HP	12,800
2 lathes	8,000
2 High pressure sprayers for use on extensive crops	5,000
2 High pressure sprayers for fruit trees	5,000
2 Low pressure sprayers for weed control	1,600
1 Grader	1,000
Irrigation measuring equipment	1,000
Miscellaneous Equipment	20,000
SUB TOTAL	$ 124,960
10% Insurance & Freight	12,496
8% to absorb price increases due to inflation	9,997
TOTAL	147,453

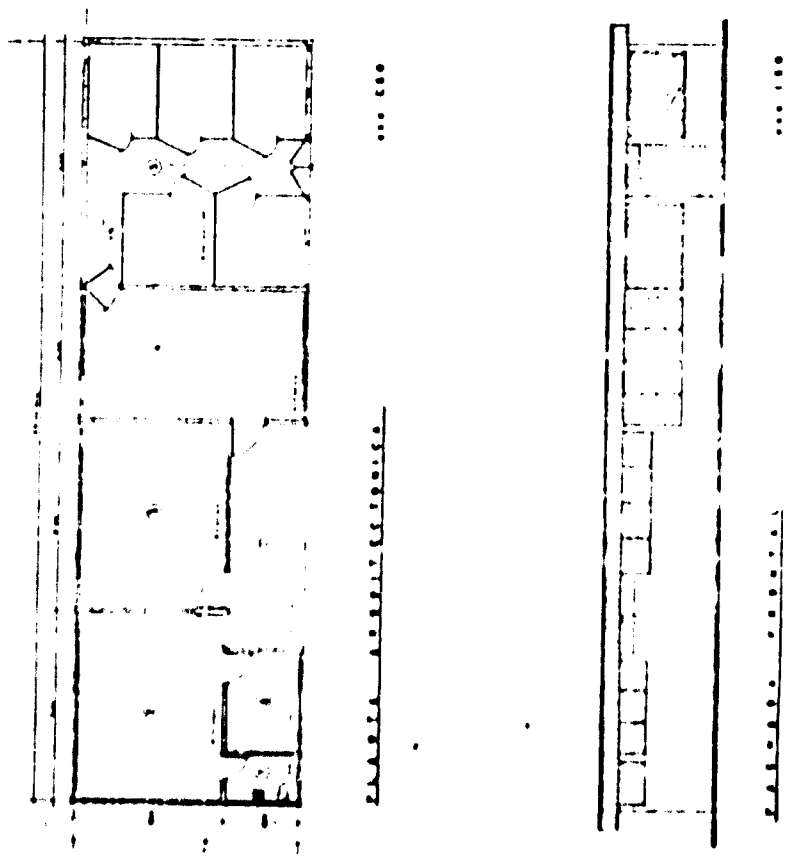
HAY BARN





BEEF CATTLE - OFFICE AND STORAGE





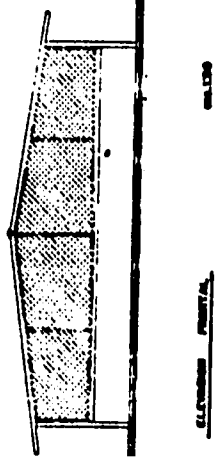
HAY BARN

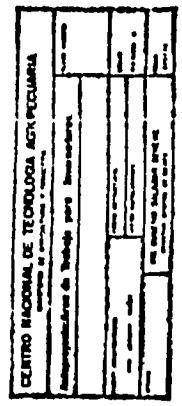
ARTICLE		ARTICLE COST
1.	Site Preparation	$ 294.-
2.	Foundations, Structural Concrete and Floor	3,675.-
3.	Masonry	4,116.-
4.	Metal Work	1,764.-
5.	Roofing & Ceiling	1,323.-
6.	Electrical	1,617.-
7.	Plumbing, Potable Water, Drainage	1,470.-
8.	Carpentry	-
9.	Windows	-
10.	Paint	441.-
	Total Construction Cost.	$ 14,700.-

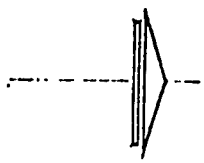
BEEF CATTLE OFFICE & STORAGE

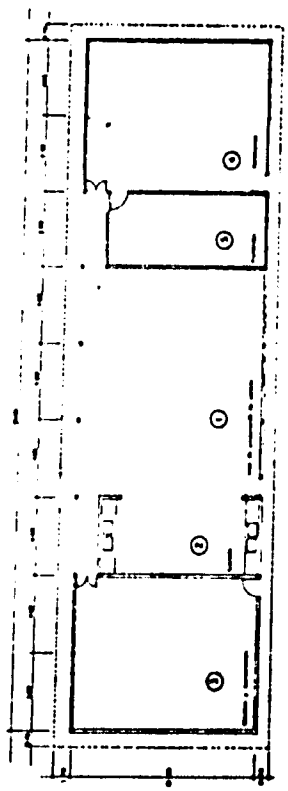
ARTICLE		ARTICLE COST
1.	Site Preparation	$ 206.-
2.	Foundations, Structural Concrete and Floor	1,648.-
3.	Masonry	1,442.-
4.	Metal Work	1,236.-
5.	Roofing & Ceiling	824.-
6.	Electrical	927.-
7.	Plumbing, Potable Water, Drainage	1,133.-
8.	Carpentry	1,030.-
9.	Windows	1,545.-
10.	Paint	309.-
	Total Construction Cost.	$ 10,300.-

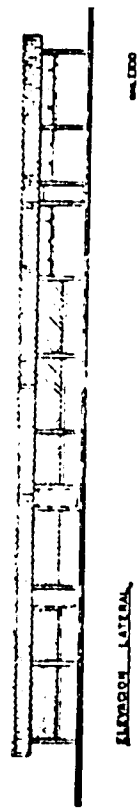
GREEN HOUSE WORKING CENTER



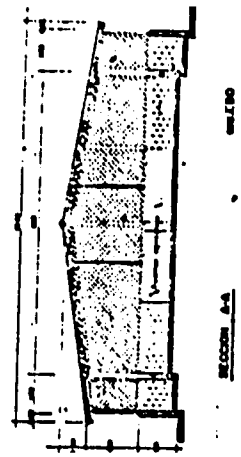


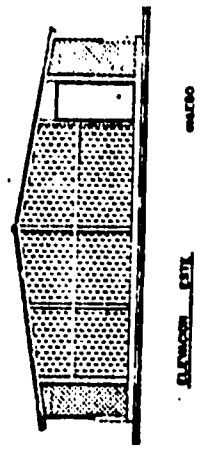


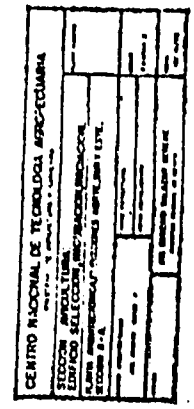


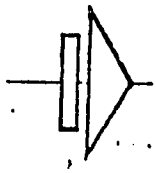


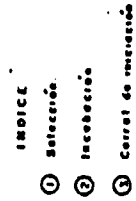
POULTRY HOUSE - INCUBATION, BREEDING

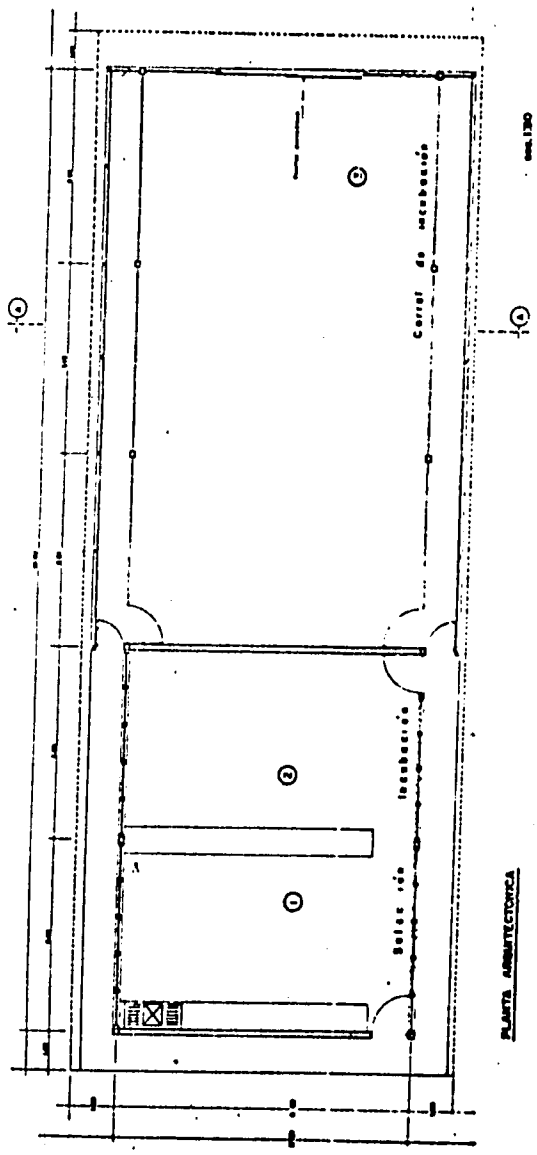


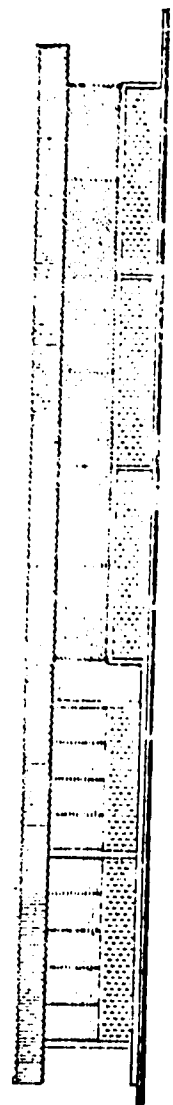


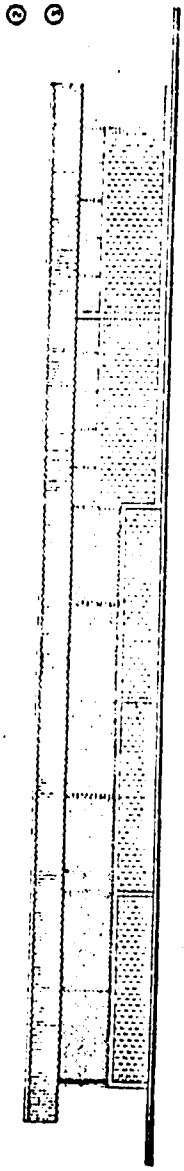












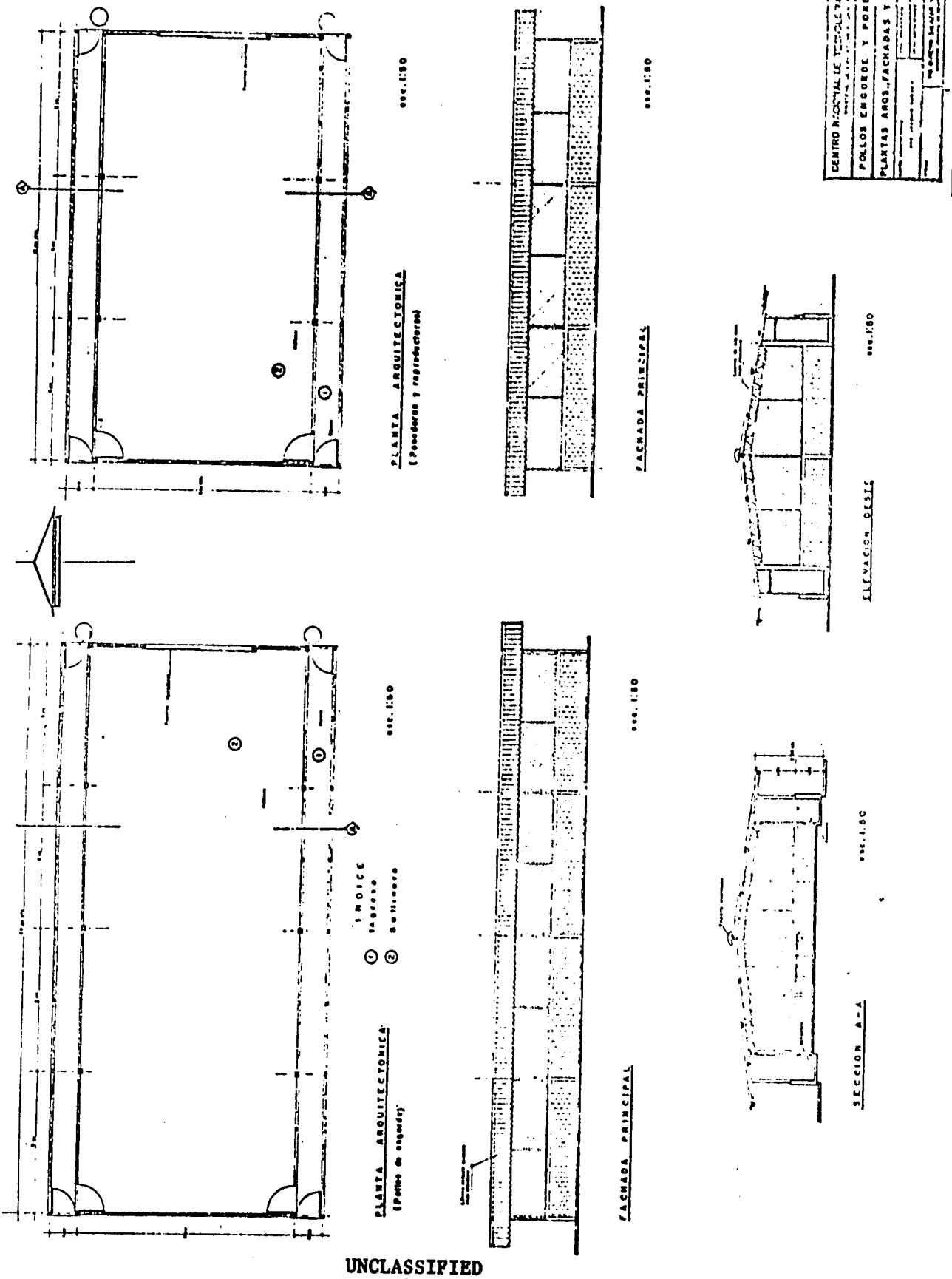
GREEN-HOUSE, WORKING CENTER

ARTICLE	ARTICLE COST
1. Site Preparation	$ 414.-
2. Foundations, Structural Concrete and Floor	5,175.-
3. Masonry	2,898.-
4. Metal Work	2,484.-
5. Roofing & Ceiling	1,863.-
6. Electrical	2,277.-
7. Plumbing, Potable Water, Drainage	2,070.-
8. Carpentry	-
9. Windows	2,898.-
10. Paint	621.-
Total Construction Cost.	$ 20,700.-

POULTRY HOUSE

ARTICLE	ARTICLE COST
1. Site Preparation	$ 184.-
2. Foundations, Structural Concrete and Floor	2,300.-
3. Masonry	2,576.-
4. Metal Work	1,104.-
5. Roofing & Ceiling	828.-
6. Electrical	1,012.-
7. Plumbing, Potable Water, Drainage	920.-
8. Carpentry	-
9. Windows	-
10. Paint	276.-
Total Construction Cost.	$ 9,200.-

BROILER POULTRY HOUSE
EGG LAYER POULTRY HOUSE



INCUBATION HOUSE

ARTICLE	ARTICLE COST
1. Site Preparation	$ 276.-
2. Foundations, Structural Concrete and Floor	3,450.-
3. Masonry	3,864.-
4. Metal Work	1,656.-
5. Roofing & Ceiling	1,242.-
6. Electrical	1,518.-
7. Plumbing, Potable Water, Drainage	1,380.-
8. Carpentry	-
9. Windows	-
10. Paint	414.-
Total Construction Cost.	$ 13,800.-

BROILER, POULTRY HOUSE

ARTICLE	ARTICLE COST
1. Site Preparation	$ 184.-
2. Foundations, Structural Concrete and Floor	2,300.-
3. Masonry	2,576.-
4. Metal Work	1,104.-
5. Roofing & Ceiling	828.-
6. Electrical	1,012.-
7. Plumbing, Potable Water, Drainage	920.-
8. Carpentry	-
9. Windows	-
10. Paint	276.-
Total Construction Cost.	$ 9,200.-

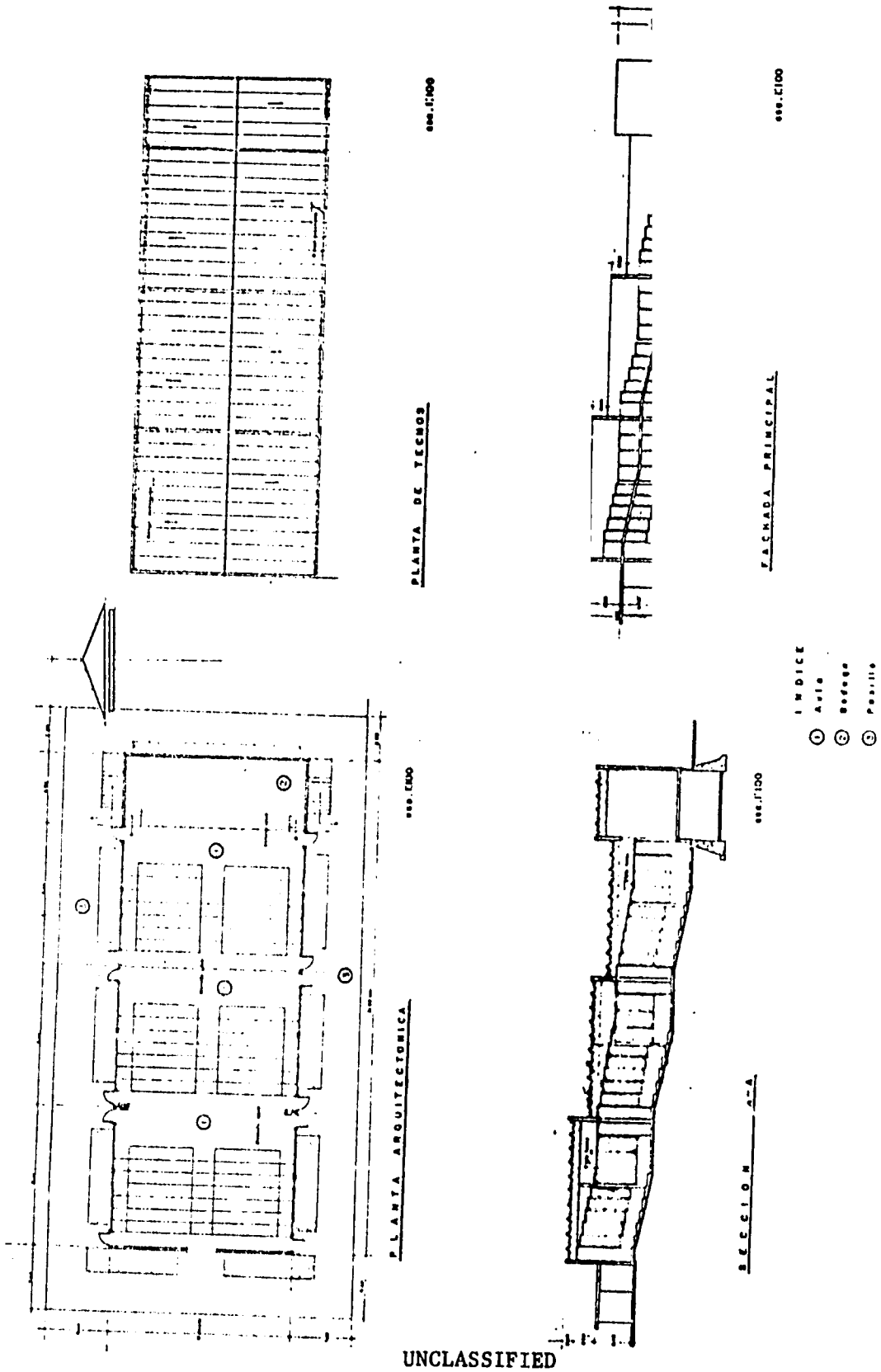
EGG - LAYER - POULTRY HOUSE

ARTICLE	ARTICLE COST
1. Site Preparation	$ 138.-
2. Foundations, Structural Concrete and Floor	1,725.-
3. Masonry	1,932.-
4. Metal Work	828.-
5. Roofing & Ceiling	621.-
6. Electrical	759.-
7. Plumbing, Potable Water, Drainage	690.-
8. Carpentry	-
9. Windows	-
10. Paint	207.-
Total Construction Cost.	$ 6,900.-

BREEDING - POULTRY HOUSE

ARTICLE	ARTICLE COST
1. Site Preparation	$ 138.-
2. Foundations, Structural Concrete and Floor	1,725.-
3. Masonry	1,932.-
4. Metal Work	828.-
5. Roofing & Ceiling	621.-
6. Electrical	759.-
7. Plumbing, Potable Water, Drainage	690.-
8. Carpentry	-
9. Windows	-
10. Paint	207.-
Total Construction Cost.	$ 6,900.-

AUDITORIUM CLASSROOM



LIBRARY BUILDING

ARTICLE	ARTICLE COST
1. Site Preparation	$ 2,160.-
2. Foundations, Structural Concrete and Floor	17,280.-
3. Masonry	15,120.-
4. Metal Work	12,960.-
5. Roofing & Ceiling	8,640.-
6. Electrical	9,720.-
7. Plumbing, Potable Water, Drainage	11,880.-
8. Carpentry	10,800.-
9. Windows	16,200.-
10. Paint	3,240.-
Total Construction Cost.	108,000.-

AUDITORIUM - CLASSROOMS - 3 UNITS

ARTICLE	ARTICLE COST
1. Site Preparation	$ 1,265.-
2. Foundations, Structural Concrete and Floor	10,120.-
3. Masonry	8,855.-
4. Metal Work	7,590.-
5. Roofing & Ceiling	5,060.-
6. Electrical	5,692.-
7. Plumbing, Potable Water, Drainage	6,958.-
8. Carpentry	6,325.-
9. Windows	9,487.-
10. Paint	1,898.-
Total Construction Cost.	$ 63,250.-

PLANTA ARQUITECTONICA _Planta Baja

esc.1:100

INDICE

① Vestíbulo
② Estar
③ Dormitorios alumnas
④ Dormitorio profesoras
⑤ W.C.
⑥ Sala de Estudio
⑦ Salida de Emergencia

WOMEN's DORMITORY

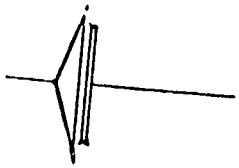
FACHADA PRINCIPAL

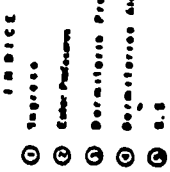
CENTRO NACIONAL DE TECNOLOGIA AGROPECUARIA

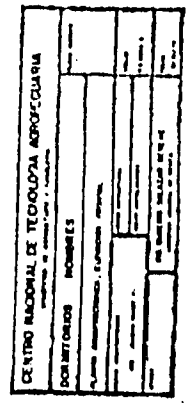
DORMITORIO MUJERES

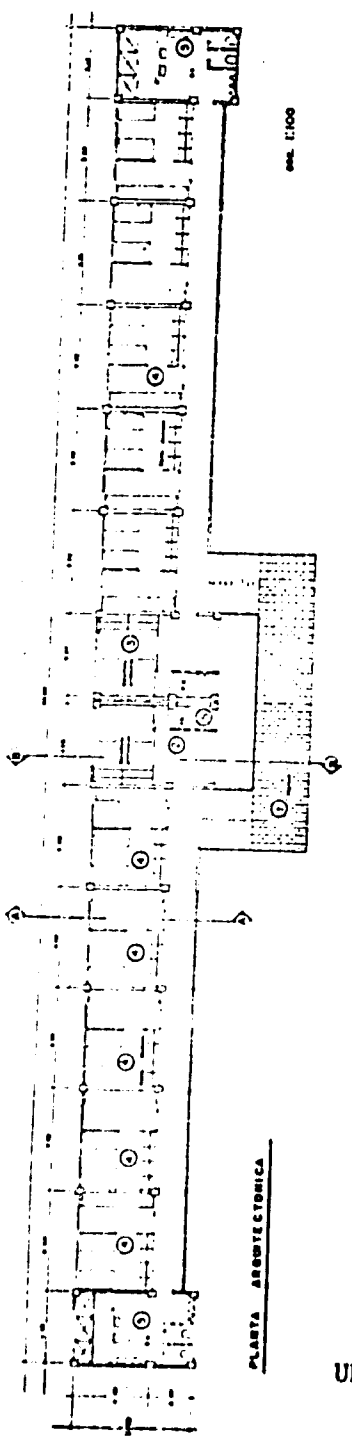
PLANTA ARQ., ELEVACIONES Y CORTES

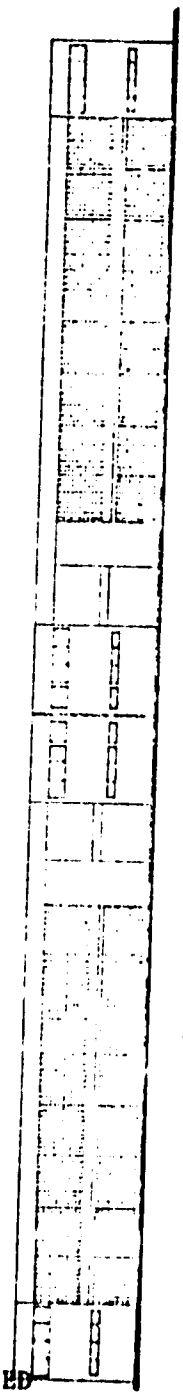
MEN'S DORMITORY

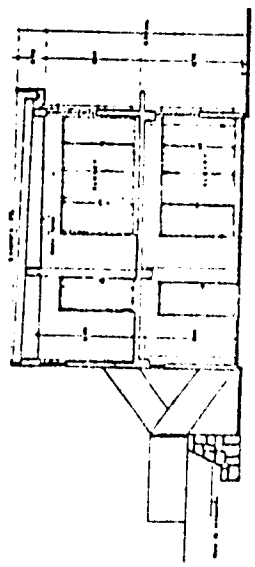


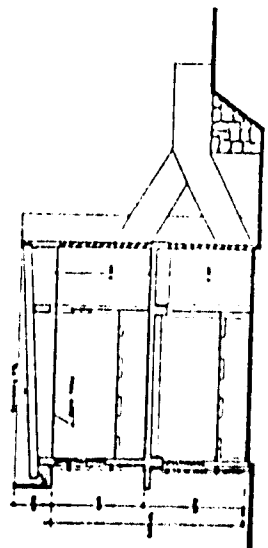




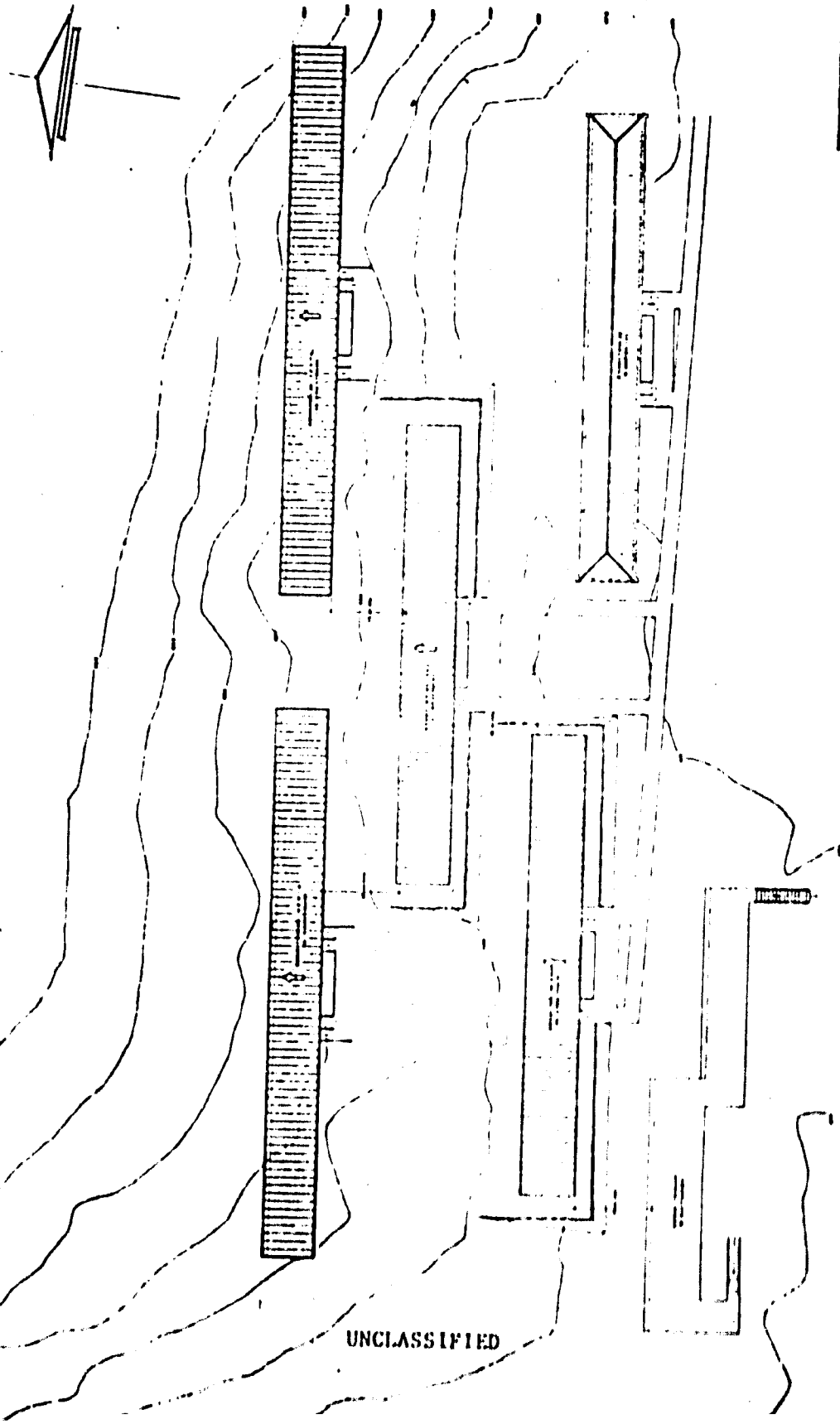








MEN DORMITORIES - ROOF LAY OUT



MEN'S DORMITORIES - ROOF LAY OUT

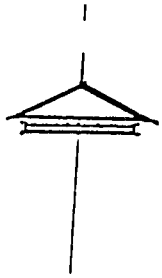
WOMEN'S DORMITORY

ARTICLE	ARTICLE COST
1. Site Preparation	$ 3,082.00
2. Foundations, Structural Concrete and Floor	24,656.00
3. Masonry	21,574.00
4. Metal Work	18,492.00
5. Roofing & Ceiling	12,328.00
6. Electrical	13,869.00
7. Plumbing, Potable Water, Drainage	16,951.00
8. Carpentry	15,410.00
9. Windows	23,115.00
10. Paint	4,623.00
Total Construction Cost	154,100.00

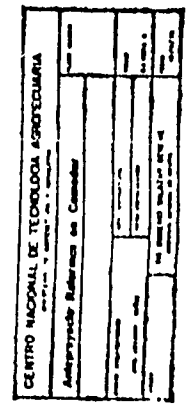
MEN'S DORMITORY

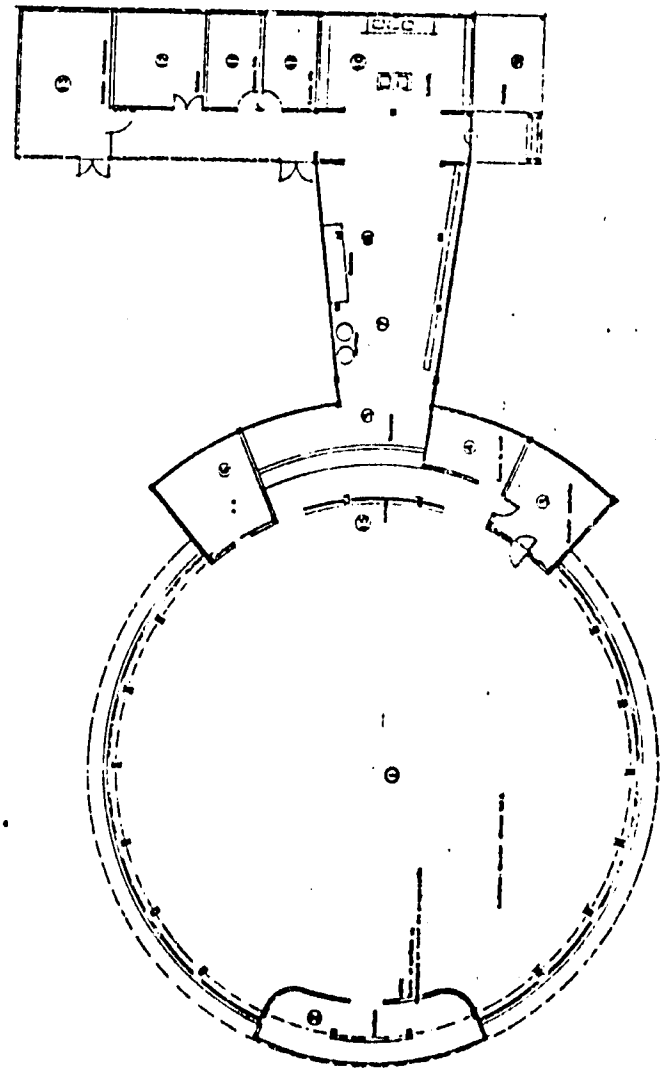
1. Site Preparation	1,600.00
2. Foundations, Structural Concrete&Floor	12,800.00
3. Masonry	11,200.00
4. Metal Work	9,600.00
5. Roofing & Ceiling	6,400.00
6. Electrical	7,200.00
7. Plumbing, Potable Water, Drainage	8,800.00
8. Carpentry	8,000.00
9. Windows	12,000.00
10. Paint	2,400.00
Total Construction Cost	80,000.00

Estar Familiar
PLANTA ARQUITECTONICA
ELEVACION FRONTAL
ELEVACION LATERAL
SECCION A-A
SECCION B-B
INDICE
① Estar Familiar
② Cocina
③ Dormitorio Hijos
④ Dormitorio Padres
PLANTA
SECCION A-B
CENTRO NACIONAL DE TECNOLOGIA AGROPECUARIA



INDICE
1 Auditorium-Comedor
2 Vestibulo
3 Comedor Empleados
4 Cuarto de servir
5 Despacho
6 Ser. Sanitarios
7 Tertulias
8 Cocina
9 Recibo
10 Lavado
11 Cuarto frio
12 Bodega
13 Comedor trabajadores





PLANTA ARQUITECTONICA

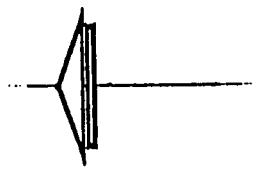
HOME ECONOMIC'S - RURAL MODEL HOUSE

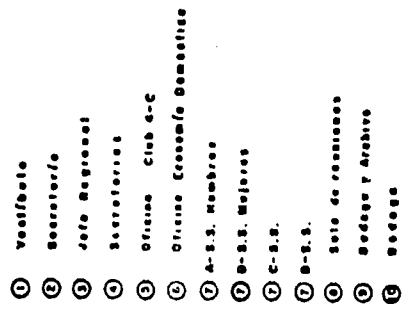
ARTICLE	ARTICLE COST
1. Site Preparation	$ 69.00
2. Foundations, Structural Concrete and Floor	552.00
3. Masonry	483.00
4. Metal Work	414.00
5. Roofing & Ceiling	276.00
6. Electrical	310.00
7. Plumbing, Potable Water, Drainage	380.00
8. Carpentry	345.00
9. Windows	518.00
10. Paint	103.00
Total Construction Cost	$3,450.00

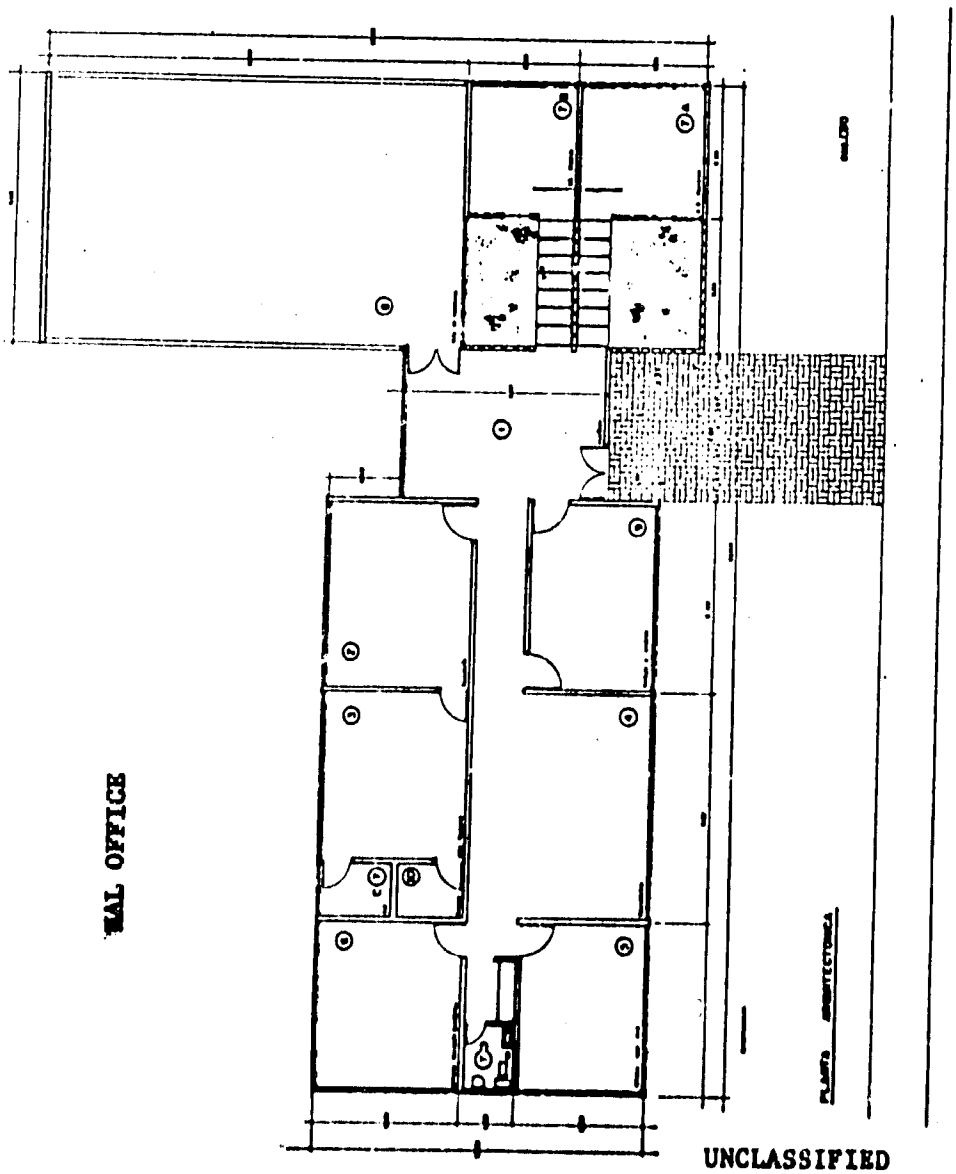
REMODELING - DINING ROOM FACILITIES

1. Site Preparation	$ 460.00
2. Foundations, Structural Concrete and Floor	3,680.00
3. Masonry	3,220.00
4. Metal Work	2,760.00
5. Roofing & Ceiling	1,840.00
6. Electrical	2,070.00
7. Plumbing, Potable Water, Drainaga	2,530.00
8. Carpentry	2,300.00
9. Windows	3,450.00
10. Paint	690.00
Total Construction Cost	23,000.00

REGIONAL CENTER





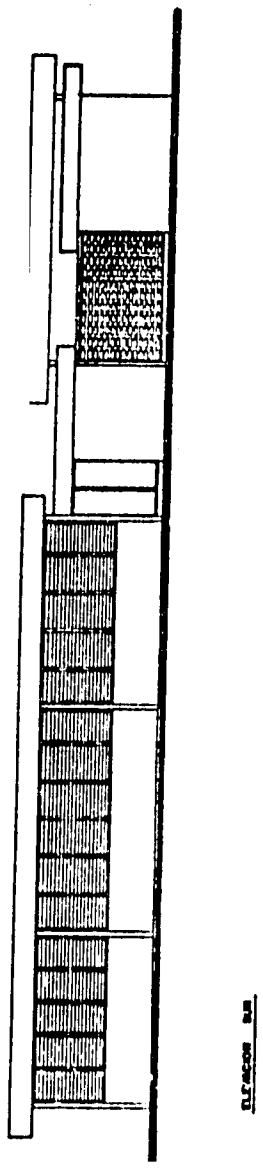


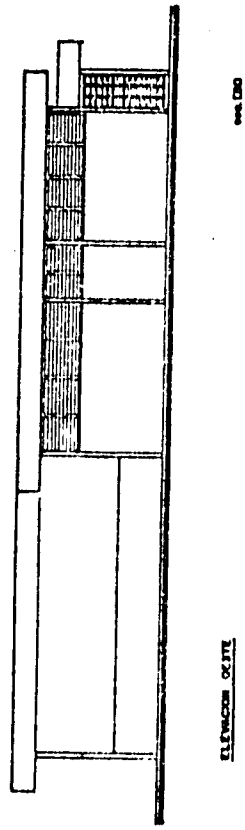
AL OFFICE

UNCLASSIFIED

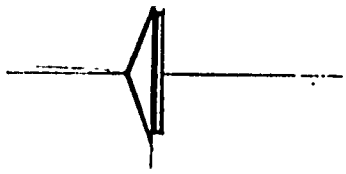
REGIONAL AND SUPPORTING CENTER ELEVATIONS

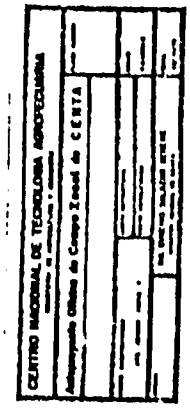
FIELD AND ZONE OFFICE
ELEVATIONS

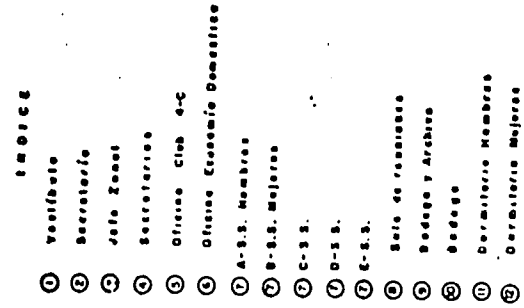


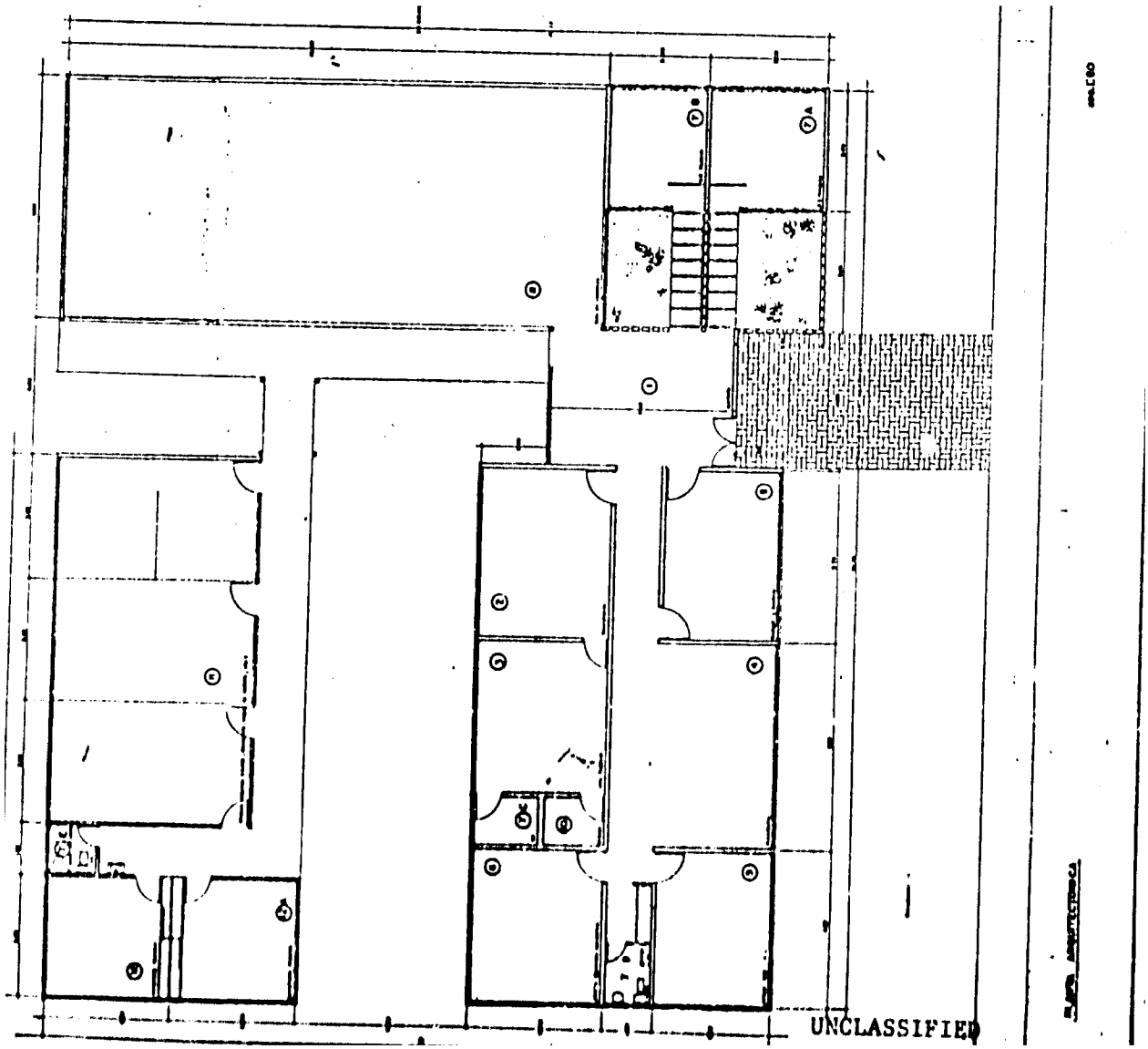


SUPPORTING CENTER









REGIONAL CENTERS - 4 UNITS

ARTICLE	ARTICLE COST
1. Site preparation	$ 102.00
2. Foundations, Structural Concrete and floor	816.00
3. Masonry	714.00
4. Metal Work	612.00
5. Roofing & Ceiling	408.00
6. Electrical	459.00
7. Plumbing, Potable Water, Drainage	561.00
8. Carpentry	510.00
9. Windows	765.00
10. Paint	153.00
TOTAL CONSTRUCTION COST	$5,100.00

ZONAL CENTERS - 21 Units

1. Site Preparation	14,104.00
2. Foundations, Structural Concrete and floor	112,832.00
3. Masonry	98,728.00
4. Metal Work	84,624.00
5. Roofing & Ceiling	56,416.00
6. Electrical	63,468.00
7. Plumbing, Potable Water, Drainage	77,572.00
8. Carpentry	70,520.00
9. Windows	105,780.00
10. Paint	21,156.00
Total Construction Cost	705,200.00

TABLE 33 E

PROPOSED EQUIPMENT FOR FOUR REGIONAL CENTERS - CENTA

Item	Quantity	Unit Price	Total $
Movie projecto Set	4	1,400.00	5,600.00
Range	4	120.00	480.00
Blender	4	20.00	80.00
Small Refrigerators	4	200.00	800.00
Sewing Machine	4	80.00	320.00
Sprayer Pump	4	100.00	400.00
Duster Pump	4	100.00	400.00
Level Transit	4	200.00	800.00
Furrow plows	4	120.00	480.00
Cultivators	4	120.00	480.00
Fertilizer Machine	4	80.00	320.00
Veterinary equipment	4	100.00	400.00
Horticulture equipment	4	100.00	400.00
Miscellaneous			
			11,000.00
10% Insurance and Freight			1,100.00
8% to absorb price increases due to inflation			880.00
			$ 12,980.00

TABLE 34E

PROPOSED EQUIPMENT FOR 21 SUPPORTING CENTERS - CENTA

Item	Quantity	Unit Price	Total $
Range	21	120.00	2,520.00
Blender	21	20.00	420.00
Mixers	21	20.00	420.00
Refrigerator	21	200.00	4,200.00
Sewing machine	42	80.00	3,360.00
Sprayer pump	42	100.00	4,200.00
Duster	42	100.00	4,200.00
Slide Projector	21	200.00	4,200.00
Level transit	21	200.00	4,200.00
Furrow plow	42	120.00	5,040.00
Fertilizer machine	63	80.00	3,360.00
Cultivator	42	120.00	5,040.00
Veterinary equipment	21	100.00	2,100.00
Horticulture equipment	42	100.00	4,200.00
Clocks	21	20.00	420.00
Transportation and Miscellaneous			2,520.00
	SUBTOTAL		50,400.00
10% Insurance and Freight			5,040.00
8% to absorb price increases due to inflation			4,032.00
	TOTAL		59,472.00

TABLE 6AE

PROPOSED RADIO EQUIPMENT FOR SUPPORTING CENTERS

25 Receiving and Transmitting units	$ 25,000
($1,000 ea.)	3,000
SUBTOTAL	28,000
10% Insurance and Freight	2,800
8% to absorb price increases due to inflation	2,240.
	$ 33,040

TABLE 31-AE

ADDITIONAL EDUCATION EQUIPMENT

Items	Quantity	Unit Price	Total $
Stainless Steel Vacuum Pan	1	1,000	1,000
Sorting Table	1	2,000	2,000
Stainless Steel Drums	4	100	400
Can Vacuum Tester	4	5	20
General Testing Thermometers	3	15	45
Open Kettles and Tanks Thermometers	3	20	60
Sealed Cans Thermometers	4	20	40
Platform Scale	1	200	200
Can Opener	2	12	24
Tinner Drums	4	25	100
Stainless Steel Scoops	4	5	20
Steam Hose	4	30	120
Stainless Steel steam Scalder	1	180	180
Bean Sheller	2	150	300
Crates for Retorts	3	20	60
Tongs	12	2	24
Solemeters-Brine Tester	12	3	36
A complete Course in Canning (Last Edition)	1	30	30
Case, Half Gallon Atlas Wide Mouth Mason jar	200	3.60	720
Corn Harvester	1	800	800
Stainless Steel Spoons	6	3	18
Stainless Steel Forks	6	3	18
Water Coolers	2	600	1,200
Water Pump	1	2,000	2,000
Wild Levels NK-10 (Universal Level)	10	400	4,000
Wild Level Transit T-16 (Universal Transit)	3	1,200	3,600
Crop Dusters (capacity 8-10 ton)	5	24	120
Sprayers (capacity 4 gal)	14	60	840
PH Meter Coleman	1	240	240
Water Stills (capacity 1gal/hr)	1	320	320
Electric Calculators	5	300	1,500

TABLE 31 AE (Cont'd)

Manual calculators	10	250	2,000
Refrigerators (medium)	2	400	800
Tank Sprayer (capacity 100 gals.)	1	1,200	1,200
Spraying Equipment	1	600	600
Cold Room	1	2,400	2,400
Grain drying equipment	1	6,200	6,200
Wargurg apparatus outfit	1	3,980	3,980
Wheelbarrow	10	12	120
Shovels	10	7	70
"Planet Junior" cultivator	5	40	200
Steam Sterilization equipment	1	1,200	1,200
Trailer Chassis (capacity 4-5 ton)	1	740	740
Waterer containers (capacity 5 gals.)	20	5	100
Cattle Squeeze	1	800	800
Molasses injector for mixing feed	1	400	400
Metal grain bin, 25 ton capacity	1	500	500
Forage Mower	1	480	480
Hay Rake	1	540	540
Hay bailer	1	1,000	1,000
Forage Chopper	1	800	800
Belt Elevator	1	800	800
Spraying equipment 8 row boom tractor mounted	1	240	240
Self-propelled combine	1	20,000	20,000
Trailer (1 1/2 ton)	1	400	400
Small Tractor 15 HP	1	3,200	3,200
Trailers (capacity 4-5 ton)	2	1,400	2,800
Tractor 40-50 HP	1	4,000	4,000
Cultivator	1	2,000	2,000
Sheller	1	1,000	1,000
Curd Milling Machine, Stainless Steel with electric motor HP alternative manual operation	1	500	500
Autoclave, horizontal vapor pressure 20 psi electric 110 volts 11x24 inch	1	1,500	1,500
Tank, circulation cleaning, complete with pump, suitable for circulation cleaning of stainless steel pipelines. Tank 14 gauge stainless with 2B finish. Also with 2 URBW-2 fittings baskets and one model 153 Pipe and fittings Rack	1	2,500	2,500

TABLE 31 AE (cont'd).

Recording thermometer for recording temperatures of CIP cleaning solutions. Taylor instrument Co.	1	350	350
Set Slides - Biochemistry	1	240	240
Set Slides - Plant Physiology	1	240	240
Triangles inside bevel finger lifts; drawing outfits	20	6	120
T square 30"ruler	20	6	120
Parallel ruler 30" transparent	20	24	480
Drawing board kits	2	80	160
Leroy Lettering sets	2	240	480
Half inch metal tape, boxes	20	6	120
Miscellaneous cans for storing vegetable seeds	10	4	40
SUBTOTAL			85,455
Expecting Price increase (8%)			6,836
Insurance and Freight (10%)			8,545
GRAND TOTAL			$ 100,836.

NOTE: No lists were provided for the Library Building and the Home Economic's Model Rural House at this time. These lists will be prepared at a later date.

DRAFT LOAN AUTHORIZATION

Provided from: ALLIANCE FOR PROGRESS LOAN FUNDS
EL SALVADOR: AGRICULTURAL DEVELOPMENT-RESEARCH, EDUCATION AND EXTENSION

Pursuant to the authority vested in the Deputy U.S. Coordinator, Alliance for Progress, by the Foreign Assistance Act of 1961, as amended, and the delegations of authority issued thereunder, I hereby authorize the establishment of a loan pursuant to Part I, Chapter 2, Title VI, Alliance for Progress, of said Act, to the Government of El Salvador, ("Borrower"), of not to exceed four million United United States Dollars ($4,000,000) to assist in financing the United States dollar and local currency costs of Borrower's program to develop an applied research capability in labor intensive and small farm crop production technologies; to improve delivery systems for transmitting the accumulated applied research knowledge to the target rural farming population to achieve improved living standards; to develop the critical mass of trained talent within the GOES necessary to accomplish technological transfers; to integrate research, extension and educational activities within one action agency of the Ministry of Agriculture; and to assist the GOES in the continued analysis of the country's agricultural problems and in the preparation and execution of new public investment projects for the sector. The loan shall be subject to the following terms and conditions:

1. Interest and Terms of Repayment:

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

2. 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 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 comptitive basis and any claims thereunder are payable in freely convertible currencies. Ocean shipping financed under the loan shall be procured in any country included in Code 941 of the A.I.D. Geographic Code Book, excluding countries which are members of the Central American Common Market.

(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 issuance of any commitment documents under the loan, the Borrower shall furnish to A.I.D. in form and substance satisfactory to A.I.D.:

(i) Evidence of the appointment of the members of the Centro Nacional de Tecnología Agrícola ("CENTA") Advisory Council by the Ministry of Agriculture;

(ii) a submission by CENTA of the completed PERT program which will serve as the implementation plan for the CENTA project and will include all construction, equipment, training and engineering services within the project.

(d) Except as A.I.D. may otherwise agree in writing Borrower shall:

(i) continue to implement the Ministry of Agriculture program of standardized salary scales and 5% annual salary increases;

(ii) proceed to appoint a minimum of 15 extension specialists.

(e) The loan shall be subject to such other terms and conditions as A.I.D. may deem advisable.

Deputy U.S. Coordinator