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Mr. Chris L. Schultz, LA/DR/ENGD
AID/W

April 26, 1971

Carl M. Fonberg, General Engineering Officer

Feasibility Study for Rural Electric Coop. E.

Enclosed are two copies of subject study report which was delivered by ENALUF this morning. It would be appreciated if you would pass one of these copies to Ron Babel.

The final draft of the CAP for the proposed loan is now under preparation.

cc: Ron Babel, LA/DR

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PN-NAR-594

ENGINEERING ECONOMIC FEASIBILITY STUDY

FOR A RURAL ELECTRIC COOPERATIVE

IN THE DEPARTMENTS OF

MADRIZ - NUEVA SEGOVIA - AND ESTELI

INCLUDING JUSTIFICATION FOR

ADDITIONAL MATERIAL FOR

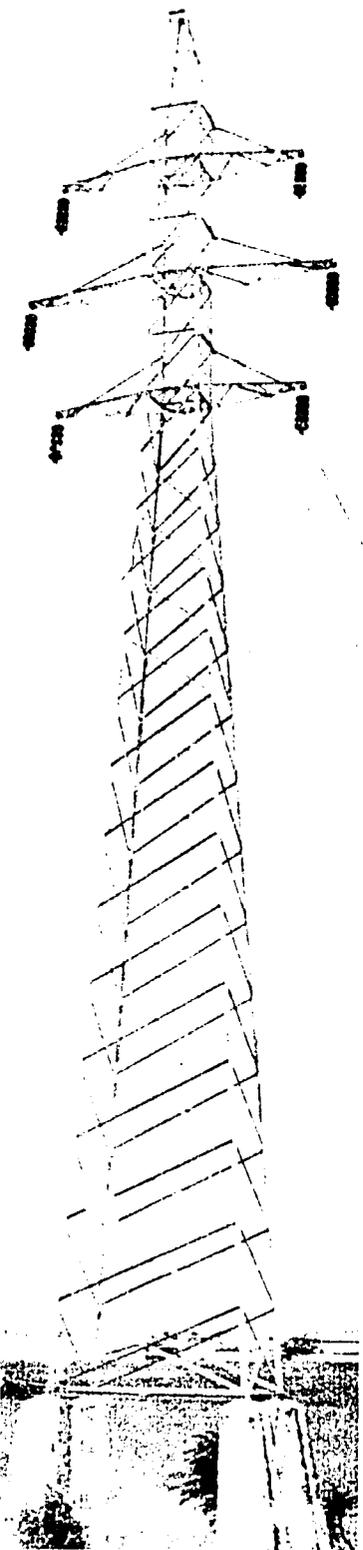
COOPERATIVES "A", "B", "C" AND "D"

IN

NICARAGUA, CENTRAL AMERICA

MARCH 1971

E.V.G. COPY



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NICARAGUA, CENTRAL AMERICA

BY

EMPRESA NACIONAL DE LUZ Y FUERZA

MARCH 1971

F O R E W O R D

Rural Electrification, through Cooperative principles, has been planted deep in the soils of rural Nicaragua.

In CAER No. 1, the seed was planted.

In the Departments of Chinandega, Rivas, Boaco, Chontales and Río San Juan we have seen the promise of a successful operation.

Now, in the Departments of Estelí, Madriz and Nueva Segovia, we are endeavoring to expand our potential in order to reap an even richer harvest.

T A B L E O F C O N T E N T S

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CHAPTER I

SUMMARY

a) Applicant

The applicant is Empresa Nacional de Luz y Fuerza, (ENALUF) a government owned autonomous entity engaged in the generation, transmission and distribution of electricity. ENALUF will relend U.S. loan funds and loan local currency project funds to the Cooperative at the same terms as the AID loan conditions.

Project

This project consists of two parts:

1. Funds covering the organization, construction and initial operation of a rural electric cooperative which will own, operate and maintain its electrical facilities and market electric energy to approximately 9,500 member-consumers initially and 19,000 within ten years in the Departments of Madrid, Nueva Segovia and two small municipalities in the Department of Estelí.
2. Materials only to construct facilities to consumers not contemplated during the development of AID Loans No. 524-L-007 and No. 524-L-021. Labor for installation of these materials will be available through cooperative force account procedures contemplated in the original engineering - economic feasibility studies and implemented during the organization and construction periods.

c) Cost

Total capital cost required for the project and the source of the funds for the project are as follows:

AID loan	US\$ 4,254,000
ENALUF Loan	US\$ 736,346
Nicaragua Gov. Loan	US\$ 1,137,654
TOTAL LOAN	US\$ 6,128,000
ENALUF Prelim. Eng.	11,000

d) Background

The 1961 Humphrey Amendment to the foreign assistance act, emphasized the role of cooperatives in developing countries. In support of this role, AID signed a contract with NRECA to provide technical services in the field of cooperative rural electrification which provided the initial impetus for exporting the "REA Pattern".

In 1964, NRECA provided technical services to assist the Nicaraguan National Energy Commission, through AID Loan No. 524-L-007, in the development of CAEER No. 1 which demonstrated the feasibility of large scale rural electric cooperatives.

This stimulated the interest which resulted in AID Loan 524-L-021 for three additional rural electric cooperative to serve an estimated 38,500 member-consumers within a 10 year period.

The engineering-feasibility study for AID Loan 524-L-021 originally included a Coop. "A" which was eliminated because of overall cost consideration at the time.

This application covers the original Coop. "A" area. However, because CAEER No. 1 has been assigned the "A" designation, this area will now be designated as Coop. "E", Departments of Estelí, Madriz and Nueva Segovia.

Project Description

The Project provides for:

1. All of the electric transmission and distribution facilities needed by Coop. "E" consisting of the following:

1 - 5 MVA, 69 to 14.4/24.9 KV step-down substation at Santa Clara
30 Miles 69 KV Transmission Line

410 Miles of 14.4/24.9 KV distribution lines

280 Miles of secondary and service wires

Also included in the loan is the cost of housewiring which includes a master cut-off switch and a maximum of three ceiling lights and three outlets for any residential consumer who needs this assistance; all to be the property of the Cooperative.

2. The materials for Cooperatives "A", "B", "C" and "D" are needed to cover the following types of development not contemplated when the original loans were prepared.
 - a) Three-phase service to INCEI grain elevators located throughout the four Cooperative service areas.
 - b) Within the CAEER No. 1 service area there are approximately 200 signed members who desire service and are waiting for the Cooperative to connect them up as available finances permit the purchase of materials. Currently, under construction are two 600 unit and one 200 unit rural-urban housing developments which desire electric service. Also, CAEER No.1 has recently annexed a resort area on Lake Nicaragua which provides sufficient load potential to serve a number of adjoining farms. A loan in the amount US\$100,000.00 for the purchase of materials would assist CAEER

No. 1 to more rapidly meet its utility responsibilities within its service area.

- c) Three-phase service to a total of 5000 KVA in irrigation pump load in the El Viejo substation area of the Northwest Cooperative. Within the next three years, the Standard Fruit Company contemplates an additional banana development near Villa Salvadorita which will necessitate an additional 69 to 14.4/24.9 KV step-down substation. Water resources studies in the Department of Chinandega indicate that the Standard Fruit - Company can expand their irrigation load to some 20,000 KVA and it is anticipated that the Company will request additional service on a regular basis as long as there is available water.
- d) In the Amerrisque Cooperative service area there is a similar situation involving some 2500 KVA of irrigation pump load for rice production.
- e) Initial service to some 7000 consumers in the Rivas Cooperative service area rather than the 3800 consumers stipulated in the loan documents is creating material allocation problems during the initial construction program. Also, for example, a large salt processing installation at Salinas, Rivas requiring some 25 three-phase transformer installations not contemplated in the original study. As construction is progressing, we are receiving other inquiries which we probably will not be able to serve without an additional supply of materials

f) Conclusions

The Coop. "E" area is economically feasible for development of a rural electric cooperative. It is technically and economically sound and will materially assist the development of the rural area. The additional materials requested for Cooperatives "A", "B", "C" and "D" so enhances their overall system feasibility that revised cash flow projections are not considered necessary. These may, however, be furnished on request.

g) Recommendation

It is recommended that loan funds be made available for this project, and that emphasis and support be provided for this key factor in the rural development program of Nicaragua.

LOCATION AND DESCRIPTION OF THE AREA

a) General

The Departments of Madriz, Nueva Segovia and Estelí are amongst the most densely populated rural areas of the country and for this reason were selected as one of the four areas to be considered for electrification under AID Loan 524-L-021.

The entire area is predominantly rural and with few exceptions, agriculture is the chief source of livelihood for the inhabitants.

A description of the area follows:

Nueva Segovia-Madriz-Estelí - Coop. "E"

This area is characterized by large numbers of small farms, producing cash crops. The areas are mountainous and rough. There are several large land holdings in the area, most of them devoted to cattle raising.

The total extension of the area to be electrified approximates 2,200 square miles.

Population - The population of the area to be electrified has been estimated at 193,000 in 1983. About 139,000 is considered rural and 54,000 urban.

Climate and Geography - With the exception of isolated mountain peaks found elsewhere in Nicaragua, this is the coolest region in Nicaragua due primarily to elevation. Annual rainfall varies from 40 inches in the south to about 90 inches at the northern limits. Temperatures range from about 60° to 85° F. throughout the year.

This entire area is mountainous, with steep slopes and fast moving streams. There are small, fertile valleys along the larger streams where most of the crops are grown. Elevation varies from 1,200 to 3,800 feet and changes

rapidly over short distances. Nine major small rivers drain the area and are the chief source of water for human and animal consumption. They are also used as a source of water irrigation on a limited basis in the southern limits of the area.

Infrastructure - Principal infrastructure in the area consists of roads, schools, health facilities and some electrical diesel generated power.

The paved network consists of 71 kilometers of highway. This is the Pan American Highway that passes through the southern part of the area. There are over 400 kilometers of improved all-weather roads. There is an additional 300 kilometers of dry season roads that serve the farm areas. These are passable by motorized vehicles during dry periods and used by animal drawn vehicles the year round. All of the major towns are linked to the Pan American Highway by all-weather roads.

ENALUF generates and distributes electrical power at the present time in the southern and central parts of the area. The towns of Ocotlán, Somoto, Palacagüina, Pueblo Nuevo, Yalagüina and Totogalpa have 24-hour electrical service. There are about 104 kilometers of distribution system constructed and operated by ENALUF in the area. Plans are that this will become part of the cooperative system.

There are a few small, privately operated generating units in the area. Without exception, installations are poor, services are limited to a few hours each day and costs limit the use of power to lighting with few exceptions.

Economy - In this area, the economy is strictly agrarian. Crops are considerably more important than livestock from the annual revenue point of view. There are over 10,000 farms with an extension of about 500,000

manzanas (1 manzana : 1.7 acres). About one-half of the farms are owner-operated. These crops produce an annual revenue exceeding US\$5 million. Coffee accounts for about 50 percent of the value of annual crop sales. Other important crops are corn, beans, sorghum, rice and cotton. There are about 80,000 manzanas used for the production of annual and perennial crops. Tobacco is grown as a special crop in the area of Jalapa. It is cured and dried in the area, but moved to Managua for processing and cigarette manufacture. Value of annual harvest is about \$2.5 million. Some 100,000 manzanas are used for pasture, 40 percent of which is considered improved. Plans are being implemented to construct 18 community grain drying storage plants in the cooperative area.

c) Summary of the Project

I. Coop. "E"

a. Number of present and ten-year consumers:

Residential and Small Commercial	
First year estimates	9413
Ten year estimates	18856
Industrial	
First year estimates	66
Ten year estimates	97
Irrigation	
First year estimates	21
Ten year estimates	47
Total to be served	
First year estimates	9500
Ten year estimates	19000

b.	Required Distribution Line	
	Three-phase line	175 miles
	Single-phase line	235 miles
	Service and Secondary wires	280 miles
c.	69 KV transmission lines	30 miles
d.	Estimated transmission and distribution costs	US\$ 5,128,000.00
e.	Cost per consumer for 14000 consumers (Estimated consumers with materials being purchased)	US\$ 348.00
2.	Coops. "A", "B", "C" and "D"	US\$ 1,000,000.00
	TOTAL	US\$ 6,128,000.00

C H A P T E R II

I. BASIC DATA

Existing electrical power within the Coop. "E" area is supplied by a mixture of industrial generation, private distribution, town owned systems and -- ENALUF. Much of the service is provided in limited amounts for only certain hours each day. ENALUF is an exception and provides 24 hour a day service. The rural areas are without electric service. The ENALUF owned system, to be transferred to the Cooperative can be used without any changes.

II PLAN FOR MEETING FUTURE POWER REQUIREMENTS

ENALUF has accepted the responsibility of providing a continuing and adequate power supply to the rural electric cooperatives from their 138 KV interconnected grid.

Engineering studies made by both Italian and U.S. consultants show the need for additional increments of generation in 1970 and 1972. ENALUF has secured and is implementing a loan from the World Bank to install 40 MW of steam generation in Managua which will be in operation by May 1971.

Included in the World Bank loan is the Santa Bárbara hydro project with 50 MW of generation scheduled to be in operation in two steps; the first generator to be in operation in October 1971 and the second in March 1972. These scheduled installations, along with the related transmission lines included in the loan, will meet the projected requirements of the Cooperatives. Additional generation of steam, gas and hydro are planned to be installed as the loads develop. A diagram showing the interconnected system is included in the annex.

A copy of the wholesale rate schedule that ENALUF will apply when selling energy to the Coop. "E" is in the Annex. The cost of power will be approximately US\$ 1.8 ¢ KWH, (Irrigation will be approximately US\$ 1.2 ¢ KWH)

at the points of delivery from the ENALUF interconnected transmission grid. ENALUF's proposed wholesale rate to the Cooperative is a special rate to non-profit organizations and is intended to cover only those costs related to ENALUF transmission and generation components. Special consideration has been given to irrigation loads.

This rate is flat without any incentive to the Cooperatives to improve their load factors. Later, it will be of mutual benefit to both ENALUF and the Cooperatives to introduce a demand - KWH type of rate and adjust the effective rate downward.

III. ENGINEERING ASPECTS & TECHNICAL SOUNDNESS

A. DESIGN

1. General

All Cooperative areas, including Coop. "F" were selected after considering rate of development, existing electrical facilities, potential number of Cooperative members, other means of electrification, food producing potential of the area and feasibility. The Coop. "E" transmission line -- voltage will be 69 KV. The distribution voltage is 14.4/24.9 KV. This provides the most economical initial installation that will adequately - serve in the 10th year and is consistent with the trend in Nicaragua. Three-phase substation transformers were selected because of the lower cost and the number of similar units the Cooperatives would own. One spare substation transformer was included with the 69 KV systems in AID Loan No. 524-L-021 which can also be utilized by Coop. "E". All rural electric cooperative systems will be constructed in conformance with the clearance and strength requirements prescribed by U.S. National Electrical Safety Code in conformance with prior use of this code in Nicaragua. Both the transmission and distribution system designs follow Rural Electrification long span, high strength ACSR conductor, wood pole construction. A design which has been successfully used to electrify the rural areas of the United States.

2. Transmission System

ENALUF owns and operates a generation and transmission grid from which they will furnish power to Coop. "E". Coop. "E" will build and own the 69 KV transmission facilities necessary to deliver the power to its step-down substation at Santa Clara.

The power supply consisting of ENALUF's Interconnected 138 KV System is as shown in the Annex. These lines are quite new with an average age of less than 8 years. ENALUF has 147,000 KW of generation feeding this grid and is implementing loans for 50,000 KW to be installed in 71 - 72. ENALUF has operated since 1955 and have had an average expansion rate of 14% per year for the last five years. The average outage time on the transmission grid has been 2½ hours per year.

3. Substations & Switching Structures

The Coop. "E" 69KV transmission line connecting to ENALUF's main transmission grid is being equipped with an interruptor to protect ENALUF from a sustained fault as well as to protect the Cooperative transmission facilities. The substations providing the utilization voltage of 14.4/24.9 KV are located as necessary to provide adequate voltage to all Coop. "E" members. They are of a one or two bay design and use steel for all structures with aluminum conductors. The transformer size has been standardized at 5000/6250 KVA with automatic tap changing to provide a regulated bus bar voltage.

The stations are designed for three to six circuit positions complete with three-phase Oil Circuit Reclosers.

The distribution substation at Santa Clara will consist of the following:

- a) A fenced area, cleared of brush & graded for proper drainage with a gravel surface.
- b) Steel 69 KV high voltage structure(s) with gang operated disconnect(s) fuses and lightning arresters.
- c) A steel 14.4/24.9 KV low voltage structure, 3 to 4 outgoing lines with provision for oil circuit reclosers.

d) Three-phase transformer 14.4/24.9 KV low side 5000/6250 KVA with forced air cooling and automatic tap changing. Demand metering will be incorporated in the 14.4/24.9 KV circuit.

4. Distribution Systems

The design of the Coop. "E" system is based upon the number of customers and KWH usage in the 10th year. The most economical system voltage is 14.4/24.9 KV. Although the insulation cost is higher, the conductor size, number of substations and miles of transmission line is less resulting in a lower overall cost.

Voltage drop allowed on the primary is 7 volts on a 120 volt base for the 10th year loads. The secondary voltage drop is to be limited to 3 volts. Southern yellow pine poles with a minimum of 10 lbs., full length pressure treatment, meeting REA specifications are to be used. Concrete poles were evaluated before proceeding with AID Loan 524-L-021 where it was determined that initial cost and shorter span construction would result in higher overall costs. Also wood poles are lighter, easier to modify and frame in the field, permit use of less expensive hardware and are subject to less breakage in transportation and handling.

The primary and secondary conductors are to be ACSR. Average spans in the rural areas without secondary are to be 500 feet and with secondary 300 feet. The spans in town will be controlled by pole location but will average approximately 150 feet. Primary spacing of conductor is to be in accordance with REA standards. Secondary conductors in rural areas are to be separated 18 inches between conductors. The secondary in town is to be separated 12 inches. All long span construction is to be

in accordance with the manufacturers recommendation for light loading areas.

The potential members of the cooperative are very interested in having electric service and should donate the easements for the 69 KV transmission line and the 14.4/24.9 KV distribution line. The right-of-way should provide for 20 feet of cleared width and the right to remove all overhanging or leaning trees.

The cooperative line trucks are all to be equipped with two-way radio for communication between the trucks and between the office and trucks. The branch offices as well as the main office are to have two-way base station radio. A remote station will probably be necessary and should be included in the cost estimates.

B. SPECIFICATIONS

REA Specifications, contracts and practices shall apply throughout the project including the transmission lines. Steel structures shall meet REA design criteria. All material and equipment shall be brought into Nicaragua duty free. There shall not be any taxes of any kind paid by the non-profit rural electric Cooperatives on imported material.

C. CONSTRUCTION LABOR

Wood pole construction has been the standard in Nicaragua for many years. Therefore, existing equipment and skilled manpower is available. Unskilled labor is very plentiful in Nicaragua.

D. SPECIAL CONSTRUCTION PROBLEMS

Past experience has shown that construction progress is not materially affected by the wet and dry season. However, the ability to construct lines in all areas because of road conditions is contingent upon dry weather.

It is, therefore, important that the project be timed to do as much of the work as possible during a November to May dry season.

For all of the line construction and building material that will be imported from the United States, allow a one year warehouse to warehouse delivery schedule from the date on which the notice and instructions to bidders is published.

Although, there are several communities receiving part time service now, the construction of new adequate facilities should not be a problem because of the normal periods of shut down of those systems.

ENALUF has agreed to lease to the cooperative, at the cost of depreciation, their distribution facilities within the cooperative area. Only those facilities that the cooperative actually makes use of, will be leased to the cooperative. The material from the other facilities will remain the property of ENALUF after the Cooperative makes the conversions and removes the material. The leased facilities will be maintained by the Cooperative and will become the property of the Cooperative after 20 years.

Before the cooperative system can be put into full operation, it will require the construction of a transmission line and substations. However, there is available capacity in the Ocotul generating plant which will permit the cooperative to expand area operation as the new distribution lines are constructed and accepted by the project engineer.

E. PLAN FOR EXECUTION OF THE COOP. "E" PROJECT

I General

ENALUF has the experience and technical staff to provide the engineering and administration on the distribution and 69 KV transmission lines.

ENALUF proposed to furnish all of the engineering services in the form of a loan to be repaid at the same rate and terms as the other part of the loan.

To accomplish this, ENALUF will contract with the cooperative to do the engineering involved in the construction of this project. ENALUF will then employ its own engineering skill or engineering consultants to do the necessary engineering work including preparation of a labor and/or material bid call and contract for both the transmission system and the distribution system, and make recommendations and perform construction inspection activities.

The engineering work on the transmission lines, substations and distribution lines will necessarily proceed simultaneously. The intent is to have simultaneous bid calls for the transmission and distribution systems in order to minimize administrative processing.

The standard REA contract provisions provide for energizing and test of the equipment prior to final acceptance by the Cooperative, turning all equipment and material guarantees and inspection certificates over to the Cooperative and one year free replacement guarantee on all labor and equipment.

2 CONSTRUCTION SCHEDULE

The following sequence of events is arranged to accomplish in an orderly procedure from the approval of the loan through the construction of the total project. The graph schedule has been established realizing the need to make maximum use of simultaneous progress in order to complete the project in three years. Any delay in bid calls and awards cannot be made up in the construction time.

- a) Secure the loan approval. (Estimated time June 1971)
- b) Complete design and prepare bidding documents for a material only bid for the distribution material, receive bids, evaluate and make recommendations, obtain approvals, award material contracts and receive materials. (Estimated time August 1972)
- c) Complete design of the 69 KV system (Estimated time December 1971)
- d) Complete the organization of the Cooperative in order to approve a contract with ENALUF for the engineering. (Estimated time September 1971)
- e) ENALUF to commence the engineering and to secure the service of the necessary engineering personnel and technical specialists immediately upon notification of loan approval. (Estimated time August 1971)
- f) The cooperative to hire the General Manager. (Estimated time to evaluate and screen October 1971)
- g) ENALUF to assist the cooperative in securing membership, applications and easements making the maximum use of local self-help. (Continuous simultaneous operation)
- h) Prepare bidding documents for a labor only bid for construction of the distribution system, receive bids, evaluate and make recommendations, obtain approvals and award a construction contract. (Estimated time August 1972)
- i) Same for transmission labor and material contract. (Estimated time August 1972). (Construction to be completed by December 1973)

- j) Complete design and prepare bidding documents for a labor and material bid for the construction of the office and warehouse, advertize for bids, receive, evaluate, obtain approvals, and award a contract.(Estimated time December 1972)
- k) Stake lines and prepare staking sheets. (Continuous simultaneous operation)
- l) Construct electric distribution facilities. (The Sébaco--Yalagüina transmission line and substation must be completed along with the Cooperative transmission line and substation prior to the Cooperative taking over ENALUF facilities). (Estimated completion time December 1973 - June 1974).
- m) Energize customers. Upon completion of a section of distribution line and acceptance by the Engineer and the cooperative, that section of line can be energized and the customers connected. (Continuous simultaneous operation)
- n) Construction of the building. These should be ready when the operating personnel are required prior to energizing the first lines. (Estimated time December 1973)
- o) The acquiring, connecting, rebuilding or removing of the existing facilities. (Simultaneous operation after the cooperative has electric power available to provide adequate customer service.)

F. OPERATING ORGANIZATION

The Coop. "E" will employ and develop its own personnel capable of operating and maintaining the distribution system and substations, providing member services, and managing all the related affairs of the enterprise. The cooperative

will contract for specialized services with ENALUF, such as operation and maintenance of the transmission lines. Maintenance of office and communications - equipment will be under service contracts with the equipment suppliers. Legal and audit service will be retained. Technical assistance will be furnished by ENALUF for such things as training material men, setting up records, repairing, setting and testing reclosers, regulators and meters, etc.

During the organization, construction and early stage of operation of the Cooperatives, the necessary technical specialists will be employed by ENALUF. Provision for the construction of the necessary offices and warehouses has been included as a part of this project. A small Branch warehouse-office will be required by the Cooperative. Typical office and warehouse plans are included in the annex. However, a complete design should be prepared by a qualified architect prior to construction.

The hiring of the manager will be a first requirement of the Board of Directors of Coop. "E". Also all employees will meet the minimum standards for the particular jobs, as listed on the man specifications in the Annex. All the Managers and key personnel should have special cooperative training.

G. OVERALL TECHNICAL SOUNDNESS

Most of rural North America has been electrified with the basic design proposed in this study. This is a method that has been tested and proven. The systems as designed provide electric service to the members for productive use of electricity for all the electrical loads that can be anticipated for the next 10 years and, with only minor cost, the carrying capacity of the system can be doubled to maintain quality service in the future.

IV FINANCIAL ASPECTS

A. Proposed source and Financing

	<u>Local Cost</u> <u>US\$</u>	<u>Foreign Cost</u> <u>US\$</u>	<u>Total Cost</u> <u>US\$</u>
1. <u>Coop. "E"</u>			
AID Loan		3,254,000	3,254,000
ENALUF (Eng. & Cash)	736,346		736,346
Nicaraguan Govt.	1,137,654		1,137,654
PROJECT TOTAL	1,874,000	3,254,000	5,128,000
2. <u>Coops. "A", "B", "C" & "D"</u>			
AID Loan		1,000,000	1,000,000
Cooperative "A", "B", "C" and "D" (Force Account)	500,000		500,000
PROJECT TOTAL	500,000	1,000,000	1,500,000
3. The cost breakdown are shown in detail in the Annex.			

B. Estimated AID Financed Items

The entire cost of material procurement including: material for the transmission lines substations, distribution lines, buildings, trucks, tools and work equipment, office equipment, furniture, communications, etc. are to be financed by the Loan. All of which is shown in the annex.

Under current AID procedures, it is our understanding that AID will consider financing materials purchased in Mexico, Central America (except Nicaragua) Panamá and South America. Under these conditions the following quantity of materials might come from other than U. S. source.

1.	Poles from Guatemala, Honduras and/or others	US\$ 700,000
2.	Conductor from Costa Rica, El Salvador, Mexico and/or others	US\$ 500,000
3.	Meters from Mexico and/or others	US\$ 200,000
4.	Insulators from Brazil, Mexico and/or others	US\$ 115,000
5.	House Breaker boxes from Costa Rica, Mexico and/or others	US\$ 140,000

C. Annual Costs

The annual costs of operation have been estimated for each of the first ten years of operation. These costs have been computed based upon accumulating reserve during the first ten years and starting the principal repayments in the 10th year. The interest rate is 2 (two) percent. The costs are shown in detail in the Annex.

D. Annual Income

KWH usages and KW demands are based on historical information taken from the ENALUF system and weighted to reflect the local conditions including income levels and potential usage of the land.

The proposed rate schedules will result in a rate reduction to potential members in most of the areas to be served by the Cooperative. The proposed rate schedules are included in the Annex. The revenue has been computed on the basis of an average of 45% of the potential consumers taking service the 1st. year and 60% of the potential consumers taking service the 10th year. The total number of potential consumers in the 10th year was projected from the growth rate between 1950 and 1963 census. The deferment of principal payments until the 10th year allows for the build up of adequate cash reserves and

operation with an annual margin. Revenue projections are included in the Annex.

E. Economic Justification and Profitability of the Project

The financial statements were prepared in accordance with the following

Interest at 2 (two) percent on all money. Average depreciation rate of 3% of plant.

Amortization rate of 30 years after 10th year (adjusted for equal annual payments).

There are no applicable taxes.

The electric system has been designed to be adequate to serve the load for the first 10 year without changes except the addition of new customers and approximately 1/3 of this cost is included in the loan. After the first 10 years it is anticipated that additional services for the customers can be financed from the margins of the cooperative.

The proforma balance sheet and the financial projection showing the profit and loss and cash flow for 10 years are included in the Annex.

V. NATIONAL ECONOMIC BENEFITS

This project will directly benefit people in the rural areas of the Departments of Madriz, Nueva Segovia and Esteli and those Departments currently being served by Coops. "A", "B", "C" and "D".

The nation as a whole will benefit indirectly from rural electrification. The project is consistent with the President of Nicaragua's program of highest priority to increase the economic level of the rural population, and increase the supply of gross national product by improving and increasing agriculture. Wide spread area coverage type rural electrification is a vital factor in the support of the intensified rural development and in stabilizing the rural population.

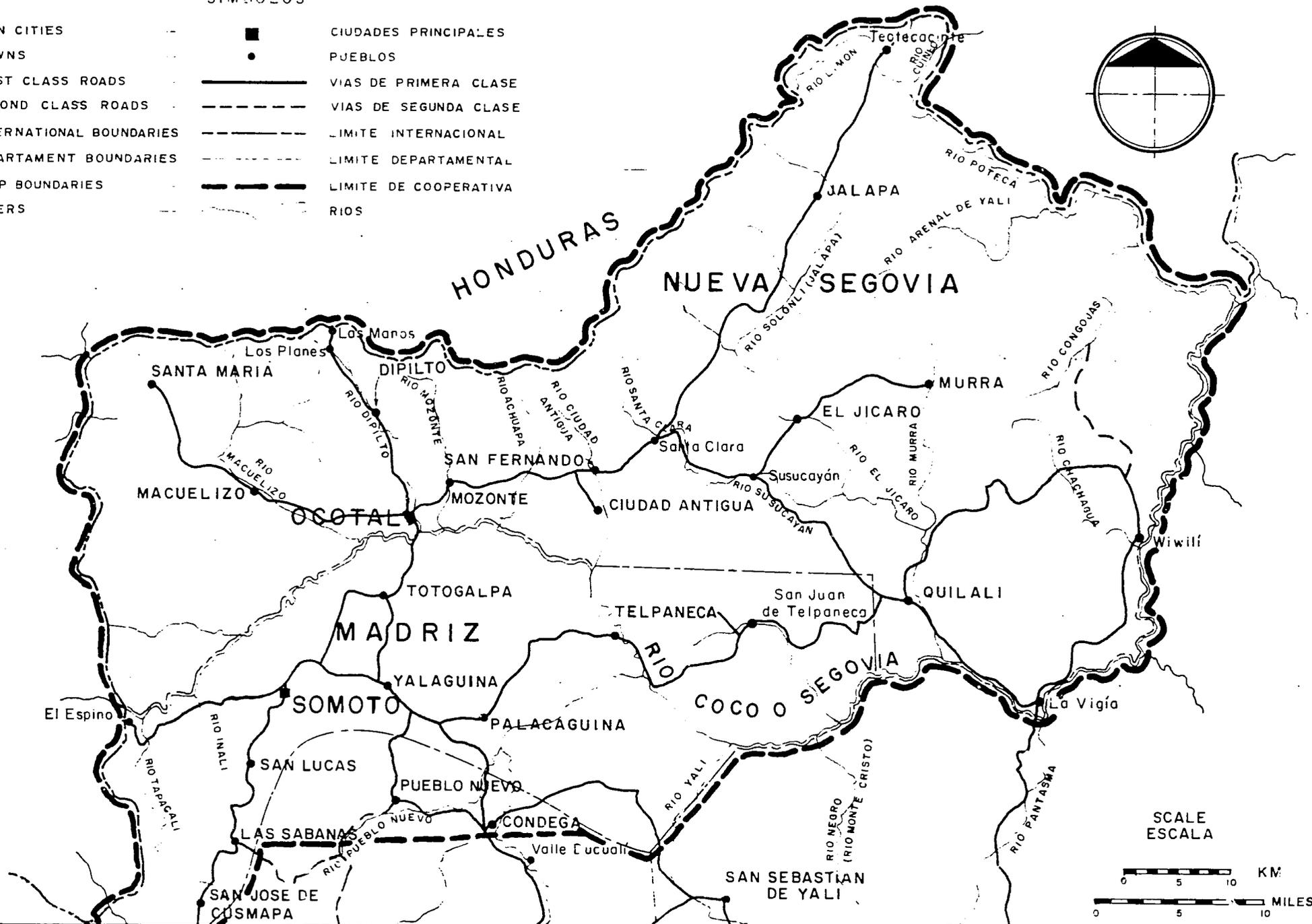
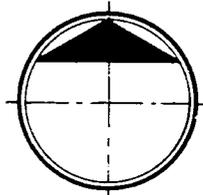
Specific productive uses of electricity in the Coop. "E" area will be for irrigation, grain and tobacco drying, butter and cheese production, machines shops, grinding machines, ice plants, cement block plants, processing of juices, manufacture of furniture, cots and ladders.

Participation in these member owned and operated electric systems afford excellent opportunity for rural leadership development.

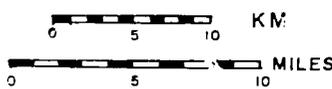
mcl.

SIMBOLOS

- | | | |
|--------------------------|-----------|-----------------------|
| MAIN CITIES | ■ | CIUDADES PRINCIPALES |
| TOWNS | ● | PUEBLOS |
| FIRST CLASS ROADS | — | VIAS DE PRIMERA CLASE |
| SECOND CLASS ROADS | - - - | VIAS DE SEGUNDA CLASE |
| INTERNATIONAL BOUNDARIES | - · - · - | LIMITE INTERNACIONAL |
| DEPARTAMENT BOUNDARIES | - - - - - | LIMITE DEPARTAMENTAL |
| COOP BOUNDARIES | - · - · - | LIMITE DE COOPERATIVA |
| RIVERS | ~ | RIOS |



SCALE
ESCALA



EMPRESA NACIONAL DE LUZ Y FUERZA
NICARAGUA C.A.

GERENCIA DE ELECTRIFICACION

ZONA "E" NUEVA SEGOVIA
MADRIZ Y ESTELI

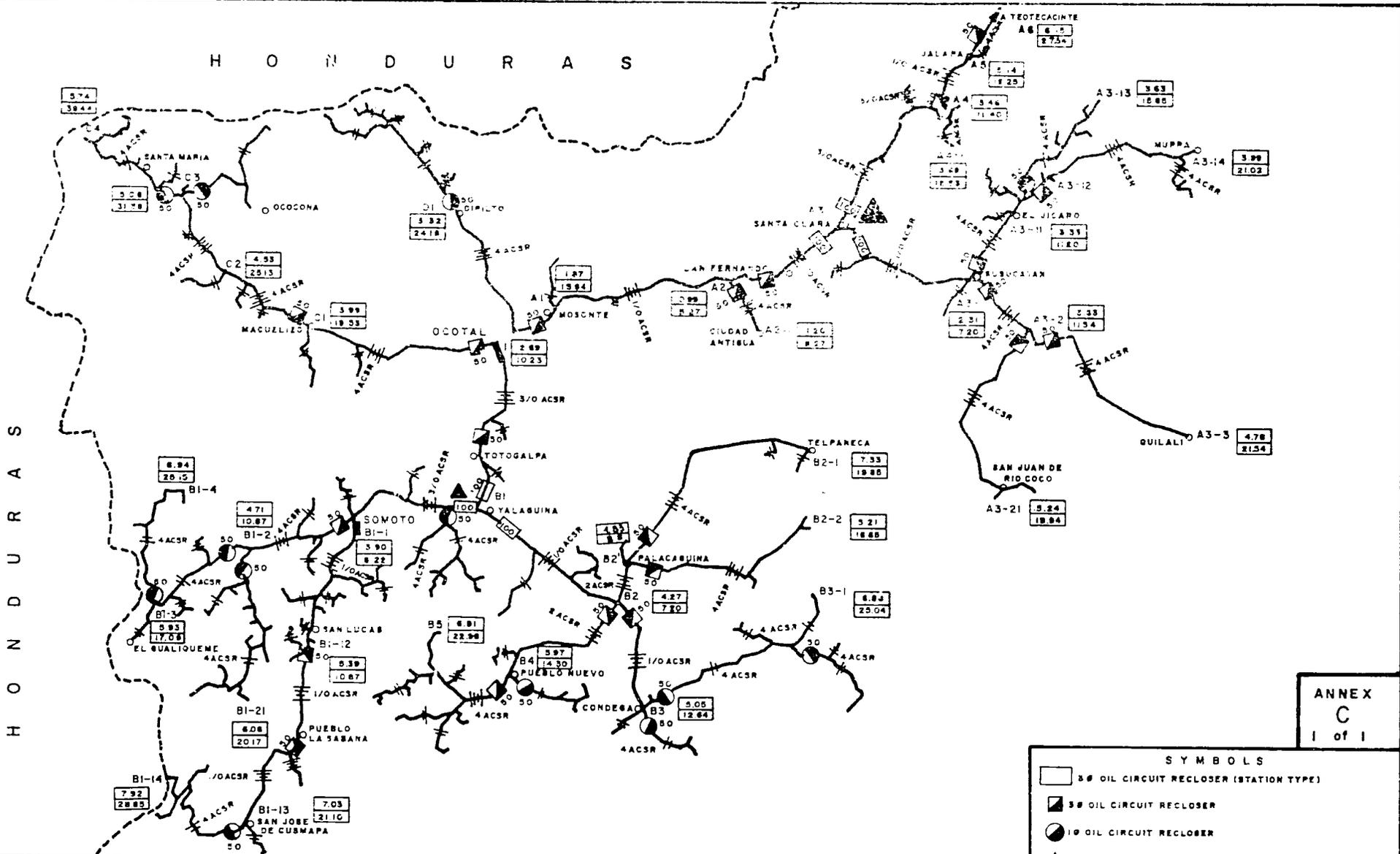
AREA COVERAGE
AREA CUBIERTA POR LA COOPERATIVA

ELABORADO	DIBUJADO	FECHA
	Gustavo Davila	23 DE MARZO 1971

HOJA Nº
ANNEX B

! of 1

HONDURAS



ANNEX
C
1 of 1

EMPRESA NACIONAL DE LUZ Y FUERZA
NICARAGUA C.A.
GERENCIA DE ELECTRIFICACION

ZONA "E"
NVA. SEGOVIA, MADRIZ Y ESTELI

PRIMARY DISTRIBUTION SYSTEM AND
SUBSTATIONS

SYMBOLS

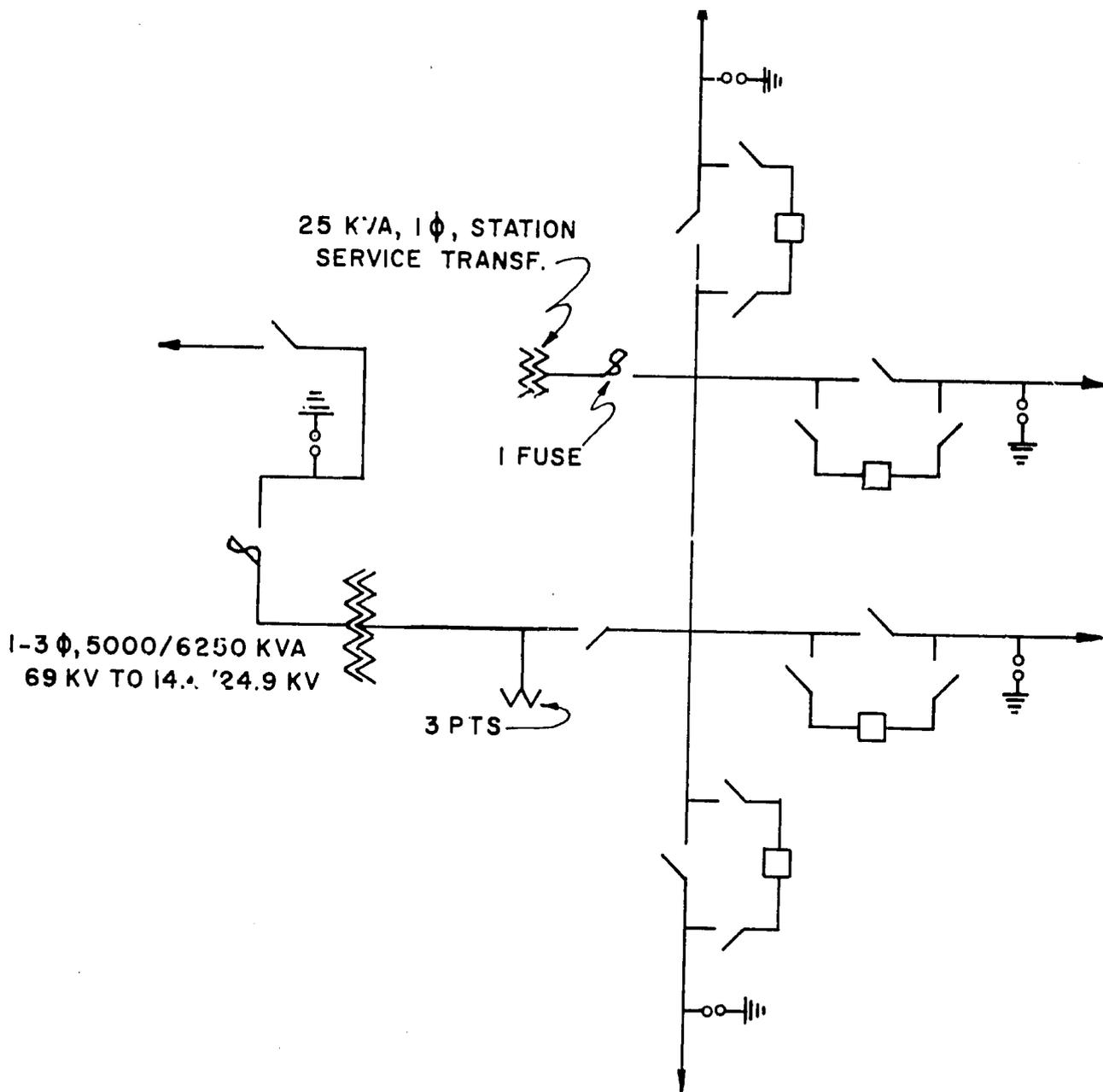
-  50 OIL CIRCUIT RECLOSER (STATION TYPE)
-  50 OIL CIRCUIT RECLOSER
-  10 OIL CIRCUIT RECLOSER
-  SUBSTATION

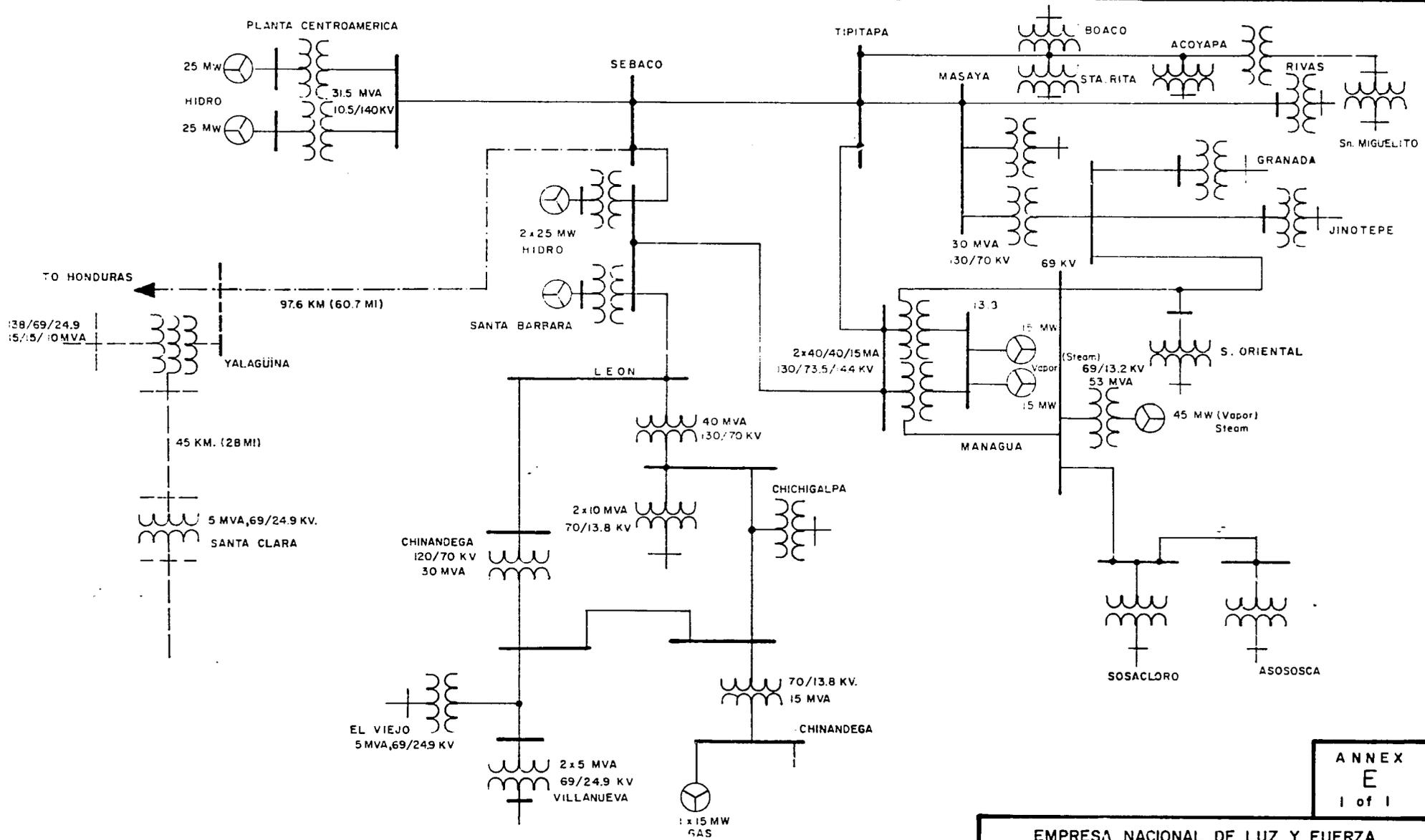
 VOLTS DROP TO POINT
 DISTANCE, MILES FROM POINT TO SOURCE

30 10

STA. CLARA SUBSTATION

ONE LINE DIAGRAM





ANNEX
E
1 of 1

**EMPRESA NACIONAL DE LUZ Y FUERZA
NICARAGUA C.A.**

ONE LINE DIAGRAM OF THE NATIONAL INTERCONNECTED
SYSTEM AND COOP SUBSTATIONS-TRANSMISSION LINES

TRACED BY: ING. OSCAR GALLO	DWN. BY: G. SEQUERA C.	DATE: 22/2/71
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CONTINUITY OF SERVICE FROM ENALUF

Zone "E" (Mudriz - Nueva Segovia) - Estelf)

The cooperative source of power will be a 138 KV transmission line with a take off from the Sébaco substation to serve the Honduras Interconnection. Therefore, service continuity conditions to the Cooperative area will be the same as that experienced in any other part of the ENALUF interconnected system. The main source of outages would be the radial 69 KV transmission line serving the Cooperative's Santa Clara substation area which can be expected to behave in the manner of any other transmission line in the ENALUF interconnected system.

ENGINEERING & CONSTRUCTION SCHEDULE

	1971					1972					1973					1974												
	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S
AN-REQUEST SUBMITTED & APPROVED	█																											
ALUF TO OBTAIN ENGR CONTRACT WITH OPS	█	█	█	█																								
ALUF TO OBTAIN CONTRACT SPECIALISTS	█	█	█	█																								
ALUF TO OBTAIN ENGINEERS	█	█	█	█																								
OPS TO HIRE GENERAL MANAGER					█																							
MEMBER APPLICATIONS FOR SERVICES						█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
PREPARE PLANS & SPECS & ADVERTISE CALL FOR BUILDINGS								█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
PREPARE PLANS & SPECS & ADVERTISE CALL FOR DISTRIB MATERIAL								█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
PREPARE PLANS & SPECS FOR TRANSMISSION LINE								█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
PREPARE PLANS & SPECS & ADVERTISE CALL FOR DISTRIB LABOR								█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
ADVERTISE BID CALL FOR TRANSMISSION LABOR & M.								█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
ROUTE D & T LINES																												
SECURE EASEMENTS FOR TRANSMISSION LINES																												
ACQUIRE SITES FOR SUB-STATIONS & OFFICES																												
OPEN BIDS, EVALUATE, GET APPROVAL & WARD BUILDING L & M																												
OPEN BIDS, EVALUATE, GET APPROVAL & WARD DISTRIBUTION L																												
OPEN BIDS, EVALUATE, GET APPROVAL & WARD DISTRIBUTION M																												
OPEN BIDS, EVALUATE, GET APPROVAL & WARD TRANSMISSION L & M																												
CONTRACTOR TO OBTAIN MATERIAL																												
SECURE RIGHT OF WAY																												
MAKE LINE																												
RECEIVE MATERIAL DISTRIBUTION																												
CONSTRUCT BUILDING																												
CONSTRUCT TRANSMISSION LINE																												
CONSTRUCT SUBSTATIONS																												
CONSTRUCT DISTRIBUTION LINES																												
RECRUIT, SCREEN & TRAIN COOP EMPLOYEES																												
ORGANIZE TRANSMISSION LINE-S S & DISTRIBUTION LINE																												
ACQUIRE EXISTING ENALUF DISTRIBUTION ILITIES																												
CONNECT REBUILD OR REMOVE AS REQUIRED																												
ORGANIZE CUSTOMERS																												

ENALUF RATES TO COOPS

a) General Rates

ENALUF will charge actual generation, transmission, accounting and amortization costs plus 20% for reserves. (rate of return, amortization etc.). The costs will be based on yearly audit figures of ENALUF with revisions if costs increase. The estimated rate for generation in 1971 is higher than the actual 1967 rate due to the necessity of ENALUF's relying more feavily on turbine generation in the next several years with the proportionate higher fuel costs. After 1971 with the addition of a new hydroelectric system; the generation costs should drop lower than the 1971 estimated costs thus lowering the power cost to the - coops. KWH rate estimate for 1971 is as follows:

Generation	.0556
Transmission	.0023
Amortization	.0450
Accounting & Collect.	.0014
20% Reserve	.0207
TOTAL	<u>.1250</u> per KWH

This will also be the formula for revising rates to the coops.

b) Irrigation

ENALUF will charge actual generation, transmission and general administration costs plus 45% for reserves for irrigation energy sold to the coops. The costs will be revised yearly based on previous years auditor figures. KWH rate estimate for 1971 is as - follows:

Generation	.0556
Transmission	.0023
Accounting & Collect.	.0014
45% Reserve	.0257
TOTAL	<u>.0850</u>

This will also be the formula for revising rates to the Coops.

Changes to the wholesale rates will be established by yearly independent audit of the costs to ENALUF of the factors making up the rates, as based upon the National Integrated System.

Arbitration between ENALUF and any coop will be by one person appointed by ENALUF, one person appointed by the COOP and one person appointed by mutual agreement of the two -- parties or, in absence of such agreement, by a person appointed by the SUPREME COURT.

TENTATIVE
PROPOSED COOPERATIVE RATE

GENERAL RATES

DOMESTIC (Residential)

First	50 KWH	₱0.48
Next	200 KWH	₱0.43
Next	300 KWH	₱0.33
Over	550 KWH	₱0.28
Minimum	18 KWH	₱8.40

SMALL COMMERCIAL AND INDUSTRIAL

First	50 KWH	₱0.48
Next	200 KWH	₱0.43
Next	300 KWH	₱0.33
Over	550 KWH	₱0.28
Minimum	18 KWH	₱8.40

GOVERNMENT

Each KWH	₱0.48
No Minimum	

PUBLIC LIGHTING

Each KWH	₱0.28
No minimum	

PUMPING

Each KWH	₱0.20
No minimum	

LARGE COMMERCIAL AND INDUSTRIAL

First	210 hours per KW of Maximum demand	₱0.28
Over	210 hours per KW of Maximum demand	₱0.16
Minimum charge	1000 KWH	₱288.00

TENTATIVE
PROPOSED COOPERATIVE RATE
IRRIGATION RATES

AREA OF APPLICATION

This rate will be applied to all Cooperative service area.

RATES

First	1000 KWH	¢0.16 KWH
Next	9000 KWH	¢0.15 KWH
Next	15000 KWH	¢0.14 KWH
Next	25000 KWH	¢0.13 KWH
Next	50000 KWH	¢0.12 KWH

MINIMUM

¢33.60 for 200 KWH/month.

In the case of new services whose first bill covers an incomplete billing period, the consumer shall pay the minimum.

In the same way when a service is terminated before the billing period is completed, and the registered KWH consumption is less than the minimum at the moment the service is terminated, a consumer shall pay the minimum.

APPLICATION

This rate is applicable only to energy consumption for irrigation purposes and to any other type of additional consumption derived from irrigation purposes in the rural area requiring an installation not less than 5 KW and not more than 30 KW as long as the Cooperative does not have to make extra disbursements resulting from the service connection.

Any other service within the irrigation area such as farm residential lighting, refrigeration - heating and the use of electric appliances and motor other than irrigation pumps, shall be - billed under the corresponding rates.

DEPOSITS

To guarantee payment for consumption

Each consumer shall maintain in the Cooperative a deposit in cash.

METERING EQUIPMENT INSTALLATION EXPENSES

For each new service the Cooperative will install, on consumer's account, the service drop and the meter. It will be the consumer's responsibility to have an adequate service entrance. Also, the consumer shall install an appropriate switch to be used with the meter on the consumer's interior distribution panel.

POWER FACTOR

The consumer commits himself to maintain at all times a power factor greater than 85%. If the Cooperative determines that the Consumer's power factor is less than 85%, the Cooperative will readjust the monthly bill multiplying it by a factor determined as follows:

$$FR = 1 + (0.85 - FPR)$$

Where

FR = Readjustment factor

FPR = Registered power factor

This clause referring to the power factor shall be enforced one year after this date.

SPECIAL DISPOSITIONS

This service will be available only during 20 hours a day. According to Cooperative's time regulations the service could be controlled by an automatic interrupting device which will be installed at the consumer's expense.

RECONNECTION

When the Cooperative discontinues the service for any reason, the consumer shall pay \$50.00 in order to have his service reconnected. The amount specified is only for urban consumer's; rural consumers shall pay, in addition, the base amount of \$1.00 for each kilometer or fraction of a kilometer away from the urban service area.

TENTATIVE
PROPOSED COOPERATIVE RATE
LARGE INDUSTRIAL

APPLICATION

Applicable in all areas being served by ENALUF National Interconnected System.

MAXIMUM DEMAND CHARGE

- First 25 KW registered maximum demand at \$20 per KW of registered maximum demand.
- Next 50 KW registered maximum demand at \$19 per KW of registered maximum demand.
- Next 225 KW registered maximum demand at \$16 per KW of registered maximum demand.
- Next 200 KW registered maximum demand at \$14 per KW of registered maximum demand.
- Over 500 KW registered maximum demand at \$12 per KW of registered maximum demand.

ENERGY CONSUMPTION CHARGE

All KWH at \$0.14.

The bill is equal to the maximum demand charge plus the energy consumption charge.-

If the average price is greater than \$0.28, the consumption will be billed at \$0.28 KWH unless, the minimum is billed.

MINIMUM

The minimum is the charge for maximum demand or 50% of the registered maximum demand during the last 12 months in the event that the first is less than the second.

In the case of new consumers when the bill for the first month covers the incomplete billing period, the billing shall be made in such a way as to correct the minimum demand being considered for billing according to the following formula:

$$FR = \frac{730 - \text{HRSN}}{730}$$

Where

730 = utilization hours

HRSN = Number of hours not served during the billing period

FR = Readjustment factor for maximum demand

DETERMINATION OF MAXIMUM DEMAND

The maximum demand which will be used as a base for billing shall be determined by a demand meter with 15 minute period.

APPLICATION

This rate is applicable to power services with or without incidental lighting for industrial purposes as long as the monthly maximum demand registered be equal or greater than 25 KW and that the industry is not of the seasonal type.

TO GUARANTEE PAYMENT FOR ENERGY CONSUMPTION

First	25 KW	at	€25.00/KW	installed
Next	50 KW	at	€20.00/KW	installed
Next	225 KW	at	€15.00/KW	installed
Next	200 KW	at	€10.00/KW	installed
Over	500 KW	at	€ 5.00/KW	installed

Minimum deposit 25 KW at € 25.00/KW = €625.00

In the event that the consumer under this rate increases his installed capacity, the deposit shall be increased according to the precedent rate.

METERING EQUIPMENT

The consumers under this rate shall deposit with the cooperative a sum of money equal to the price of the metering equipment.

POWER FACTOR

The consumer commits himself to maintain at all time a power factor greater than 85%. If the Cooperative determines that the consumer's power factor is less than 85%, the Cooperative will readjust the monthly bill multiplying it by a factor determined as follows:

$$FR = 1 + (0.85 - FPR) \text{ where}$$

FR = Readjustment factor

FPR = Registered power factor

RECONNECTION

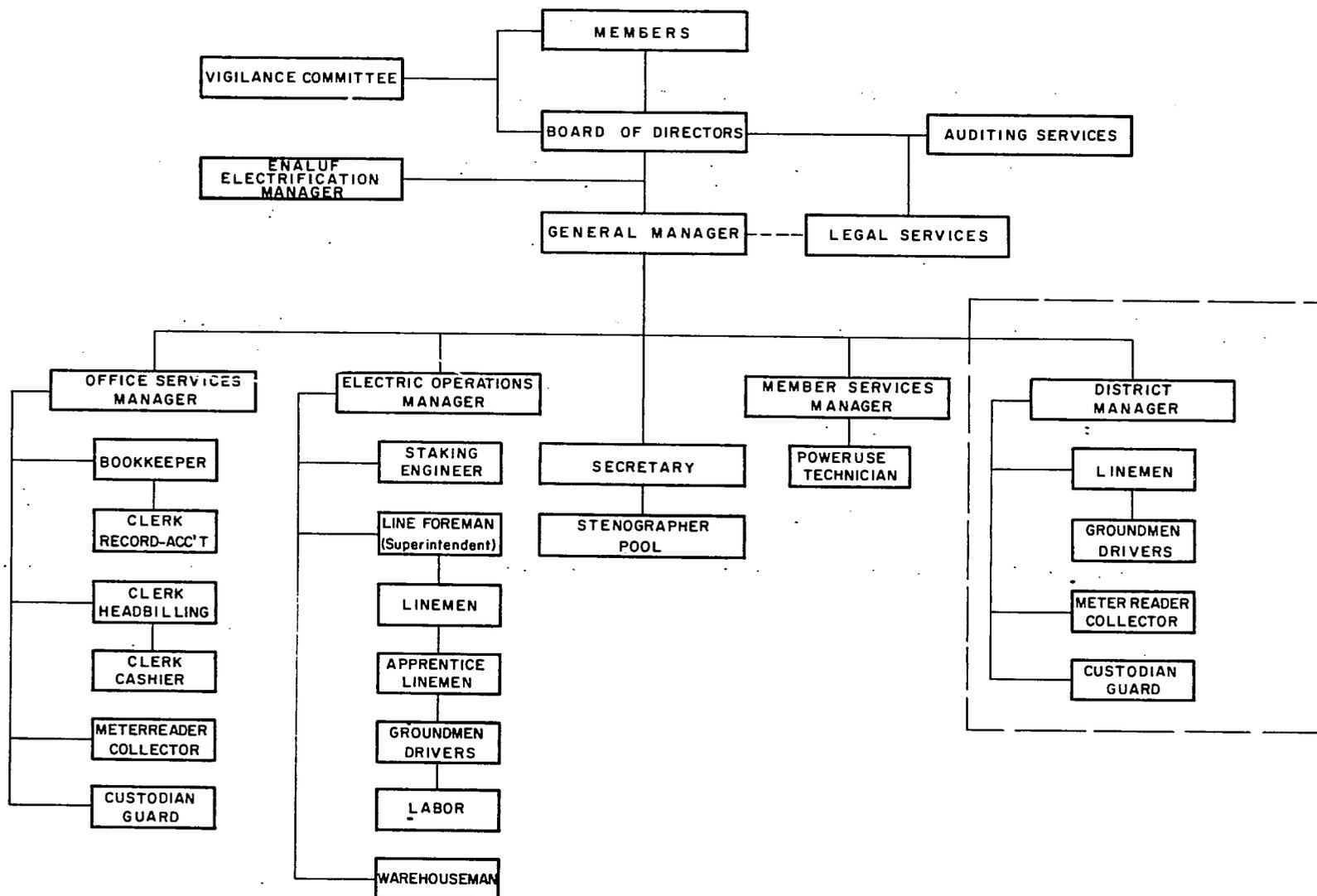
When the Cooperative discontinues any service for the customers convenience or non payment of the bill, the consumer shall pay €50.00 in order to have his service re-connected. The amount specified is only for urban consumers; rural consumers shall pay in addition, the base amount of €1.00 for each kilometer or fraction of a kilometer away from the urban service area.

DURATION OF CONTRACT

The duration period contracted for application of this rate is a year beginning with the first bill and will be yearly renewed if the consumer does not notify the cooperative that he wishes to terminate it.

In any case if the consumer requests service disconnection either on temporary or permanent basis, the Cooperative will issue bills with corresponding minimums for the remaining months to complete a year.

COOPERATIVE TYPICAL OPERATIVE ORGANIZATION



GENERAL MANAGER

The General Manager is employed by the Board of Directors to manage the entire operation of the Cooperative in accordance with the objectives and policies of the Board of Directors.

- 1) The manager is responsible for all aspects of the Cooperative including but not limited to the following:
 - a- Hiring, training and directing all employees.
 - b- Carrying out Board Policies
 - c- Directing all departments
 - d- Service continuity and quality
 - e- Maintenance procedures
 - f- Planning
 - g- Security of funds and property
 - h- Efficient bookkeeping system
 - i- Meter reading, accounting and collecting.
 - j- Construction
 - k- Member, employees and public relations
 - l- Member information and education
 - m- Power use program
 - n- Providing for member line extensions
 - o- Supervision of all employees through his staff
 - p- Approve financial and statistical reports
 - q- Submit regular and monthly report to the Board of Directors
 - r- Council with and guide the Board of Directors
 - s- Coordinating all phases of the Cooperative
 - t- Adequate controls over all operations
 - u- Annual work plans
 - v- Perform other duties as directed by the Board

II-Man Specifications

- a- Education:
Minimum of 16 years in school resulting in a degree in the area of Business Administration or its equivalent.
- b- Experience:
Minimum of 5 years in a business organization where comprehensive understanding was required, plus it is desirable to have a minimum of 5 years in a position requiring overall understanding of long range planning.
- c- Training:
A complete understanding of the Cooperative principles and a working knowledge of electricity and electric utilities.
- d- Attitude:
A genuine desire to improve the lot of mankind through the application of Cooperative principles.

DISTRICT MANAGER

The District Manager is directly responsible for the effective Administration of the Cooperative policies in the district area through the use of the department services of the main office. Among other activities he shall be responsible for the following:

- a) Request and coordinate assistance and support from the Member Services Department in the area of member education, advertising, Sales promotions, community project and in general to promote the good will of the Cooperative.
- b) Assist in developing office procedures that will provide efficient billing and accounting. Maintains records necessary for payroll, reports central purchasing, property records etc.
- c) Coordinates with the Manager of Electric Service for the Construction of lines, installation of electric equipment maintenance and operation of electric facilities in the district area.
- d) Control of this department by setting up adequate records and periodic review of the same.
- e) Maintain good public relations by providing prompt and dependable service for the members.
- f) See that transportation & work equipment are properly used and cared for.
- g) See that adequate materials and supplies are available for construction & maintenance.
- h) Maintain an effective communications and information program to obtain loyal support and cooperative team effort with other departments.
- i) Performs such other duties as assigned by the General Manager

Reports to:

General Manager

Directs :

Lineman

Meter reader - Collector
Custodian - Guard

QUALIFICATIONS

a) EDUCATION

Shall have a minimum of 14 years schooling.

b) EXPERIENCE

Shall have a minimum of 5 years experience in the electric utility field, resulting in complete understanding of all elements of line construction, minimum of 3 years experience in supervisory capacity.

c) ATTITUDE

Must have a general understanding of cooperative philosophy and belief that its method of operation will be beneficial to the members.

POSITION DESCRIPTION
FOR
MANAGER OF MEMBER SERVICES

The Manager of Member Services is directly responsible for the overall programs of public relations, power use and member education. Among other duties he shall:

- a. Plan and carry out programs to promote an increasing use of electric energy.
- b. Conduct area meetings for member education and information.
- c. Plan and direct the advertising program.
- d. Prepare necessary materials and information for use in member service activities.
- e. Provide information and assistance in regard to adequate wiring, layouts and electrification problems.
- f. Plan the activities and make arrangements for the Annual meeting.
- g. Coordinate the activities of merchants in regard to special sales promotions for electric appliances.
- h. Keep up-to-date on new products and uses of electricity that will benefit the members.
- i. Keep all employees informed of the member service activities to gain maximum team effort.
- j. Assist with community projects, when possible, to promote good will for the Cooperative.
- k. Perform such other duties as assigned by the General Manager

Reports to: General Manager

Directs: Power Use Technician
 Clerk/Typist

Qualifications:

- a. Education -- Shall have a minimum of 14 years schooling, with specialized training in marketing, journalism or related fields.
- b. Experience -- Shall have a minimum of 5 years experience in sales work and activities related to promotion. Must have been in a responsible position requiring planning and execution of complete programs of significant scope and variety.

- c. Attitude -- Must subscribe to the cooperative philosophy and be sincere in the desire to provide maximum benefits to the consumers.

POSITION DESCRIPTION
FOR
MANAGER OF ELECTRIC OPERATIONS

The Manager of Electric Operations is directly responsible for the construction of lines, installation of electric equipment, maintenance and operation of all electric facilities. His principle functions are to:

- a. Prepare annual work plans and budgets for his department.
- b. Approve work procedures and schedules for his personnel
- c. Train and develop the employees in his department.
- d. Establish necessary standards and specifications for construction jobs, approve staking sheets and supervise construction.
- e. Submit regular progress reports to the General Manager and recommend changes as necessary in policies and procedures.
- f. Establish necessary controls to measure quality of service, productivity and overall performance of the department.
- g. Develop and implement a continuing maintenance program for lines, transformers, services, right of way clearing, street lights and protective devices.
- h. See that transportation and work equipment are properly used and cared of.
- i. Plan and direct an effective safety program.
- j. Encourage good public and member relations by providing prompt dependable services.
- k. See that an adequate stock of materials and supplies are available for construction and maintenance.
- l. Maintain an effective communication and information program to obtain loyal support and enthusiastic team work of his employees.
- m. Perform such other duties as assigned by the General Manager.

Report to: General Manager

Directs : Staking Engineer - Line Foreman - Warehouse Clerk

Qualifications:

- a. Education - Equivalent of High School Diploma plus technical training courses sufficient to become knowledgeable of modern operating practices.

- b. Experience -- Minimum of 5 years responsible experience in the electric utility field, resulting in complete understanding of all elements of line construction, and the technical application of transformers, meters and other electric apparatus. Minimum of three years experience in supervisory capacity.
- c. Attitude -- Must have a general understanding of cooperative philosophy and a belief that its method of operation will be beneficial to the members.

POSITION DESCRIPTION
FOR
MANAGER OF OFFICE SERVICES

The Manager of Office Services is directly responsible for the overall consumer billing collecting, and accounting functions and responsible for the following:

- a. Develop necessary office procedures to assure productivity and efficiency in the billing and accounting activities.
- b. Prepare annual budget for the Cooperative.
- c. Prepare monthly operating and financial reports.
- d. Develop long range financial plans and cash forecasts.
- e. Analyze system operations and costs and recommend necessary action to General Manager
- f. Establish a system of accounts including general ledger, auxiliary accounts, property records and capital credits.
- g. Establish procedures for proper handling of cash receipts and expenditures.
- h. Plan for necessary insurance coverage.
- i. Maintain personnel records.
- j. Administer the employee benefits program.
- k. Calculate and prepare payroll.
- l. Develop and train employees in the department, encourage loyal support, and cooperative team effort with other departments.
- m. Establish a system for central purchasing and inventory control.
- n. Perform such other duties as assigned by the General Manager

Reports to: General Manager

Directs: Bookkeeper - Head Billing Clerk - Meter Readers
 Custodian / Guard

Qualifications:

- a) Education -- Minimum of 16 years formal education with the equivalent of a college degree in office management or business administration, with emphasis in accounting and auditing.

- b) Experience -- Shall have a minimum of 5 years responsible experience in business management, with 3 years supervisory experience.
- c) Attitude -- Must understand and accept cooperative principles and believe they can improve the socio-economic status of the members.

POSITION DESCRIPTION
FOR
STAKING ENGINEER

ANNEX "K"
Page 6 of 11

The Staking Engineer, under the direction of the Manager of Electric Operations, shall perform the following duties:

- a. Field stake line extensions and prepare necessary plans and tabulations of units for construction.
- b. Prepare and maintain adequate system maps and diagrams for planning operations, and maintenance.
- c. Maintain records of major items of electric equipment and apparatus.
- d. Maintain records of interruptions of service and current and voltage measurements.
- e. Prepare drawings and sketches as necessary for special installations.
- f. Perform such other duties as prescribed by the Manager of Electric Operations.

Reports to: Manager of Electric Operations

Directs: None

Qualifications:

- a. Education - Shall have at least 12 years of formal education with a High School Diploma or equivalent. Technical courses in drafting desirable but not essential.
- b. Experience -- Work experience with an engineering firm, construction or utility company very desirable but not essential. Most of the skills can be acquired through training on the job if proper attitude exists.
- c. Attitude -- Must understand and accept the Cooperative's objectives, and be willing to work as a team member in providing service.

SUPERINTENDENT

The Superintendent is under the supervision of the Electric Operations Manager responsible for:

- 1) Planning and carrying out operations, maintenance and construction.
- 2) Organizing linemen and their helpers into an efficient working team.
- 3) Directing the activities of construction, operations and maintenance.
- 4) Coordinating the activities of all employees in this department.
- 5) Control of this department by setting up adequate records and a periodic review of the same.
- 6) Meter reading.
- 7) Safety training and teaching first aid to all employees in his department.
- 8) Maintaining good public relations by providing prompt and dependable service for the members.
- 9) Providing sufficient records for preparing work orders.
- 10) Perform other duties required by the Electric Operations Manager

II MAN SPECIFICATION

- a) Education -- Minimum of 11 years in school resulting in a High School Diploma or its equivalent.
- b) Experience -- Minimum of 5 years in the electric utility industry plus it is desirable to have a minimum of 4 years in Supervisory Capacity.
- c) Training -- A full understanding of the Cooperative principles, and how they apply to an electric cooperative.
- d) Attitude -- A belief that the Cooperative approach will elevate mankind.

L I N E M A N

The Lineman reports to and is responsible to the Superintendent.

His principal duties are:

Perform all types of maintenance and construction work on distribution lines energized or de-energized, including the following activities:

- 1) Makes transformers and meter hookups (including 3 phase) and installations.
- 2) Perform any phase of construction from setting poles to energizing primary lines.
- 3) Interpret staking sheets and maps.
- 4) Takes outage and service calls and remedies trouble when assigned.
- 5) Perform standby service as assigned.
- 6) Install and operate oil circuit reclosers.
- 7) Follow safe working practices.
- 8) Prepares reports and records as required.
- 9) Instructs and supervises Groundmen assigned to him.
- 10) Performs such other activities as may be assigned by the Superintendent.

G R O U N D M A N

The Groundman reports to the Superintendent or Lineman as assigned. His principal duties are to perform ground work in the construction, operations and maintenance of the Cooperative's lines, including the following activities:

- 1) When assigned to Lineman, anticipates the need of, and furnishes necessary tools and materials with a minimum of direction.
- 2) Loads, unloads and handle poles and other materials.
- 3) Operates trucks, digs holes, sets poles and anchors.
- 4) Clears right-of-way and trims trees.
- 5) Loads, unloads, splices and strings wire.
- 6) Be familiar with rigging ropes and blocks and knot tying.
- 7) Repairs tools and recommends replacement where necessary.
- 8) Performs standby service as required.
- 9) Performs such other activities as may be assigned from time to time.

BOOKKEEPER

The Bookkeeper reports to and is responsible to the Office Services Manager. He is the head of the bookkeeping department and directs the activities of the office clerk and instructs all employees required to keep records.

I PRINCIPAL RESPONSIBILITIES

- a) Planning for and carrying out the office functions including customer accounting and collecting.
- b) Make all monthly routine journal entries.
- c) Prepare re-occurring Vouchers monthly.
- d) Verify invoices and prepare all checks.
- e) Balance subsidiary accounts monthly.
- f) Post all accounts to general ledger monthly and prepare a trial balance.
- g) Prepare monthly operating report
- h) Prepare statistical reports
- i) Reconcile all bank statements monthly
- j) Preparing electric bills, collecting and accounting which includes a route control of accounts receivable.
- k) Makes daily bank deposits
- l) Preparation of work orders
- m) Prepares payroll
- n) Such other activities as may be assigned by the Office Service Manager

II MAN SPECIFICATIONS

- a) Education -- Minimum of 16 years in school resulting in an accounting degree or its equivalent.
- b) Experience -- Minimum of 5 years keeping books for a business. Plus it is desirable to have a minimum of 2 years in a supervisory capacity.
- c) Training -- An understanding of the Cooperative principles and how they apply to an electric Cooperative.
- d) Attitude -- A belief that the Cooperative approach will elevate mankind

OFFICE CLERK

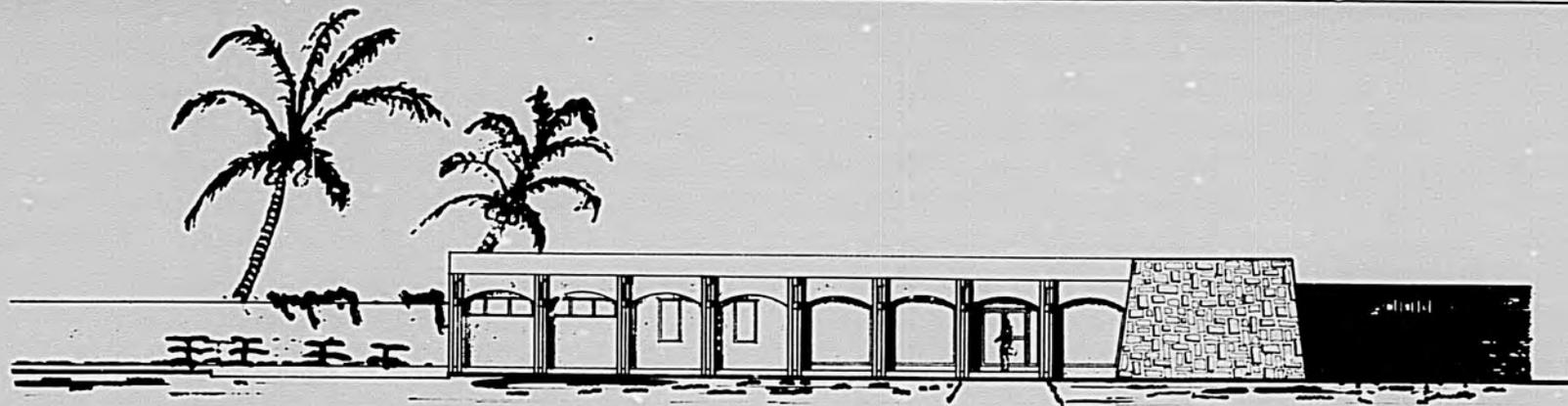
The office clerk reports to and is responsible to the Bookkeeper. He shall perform such duties as may be assigned by the Bookkeeper. His principal duties and responsibilities are:

- a) Meets and assist the public and members.
- b) Receives applications for electric services, collects memberships and shares.
- c) Acts as cashier
- d) Assists Bookkeeper in preparing monthly electric bills.
- e) Answers the telephone
- f) Prepares and keeps current member information files.
- g) Performs the duties of an office secretary
- h) Assists Bookkeeper by preparing certain subsidiary records such as material and supplies and work orders.
- i) Receives daily mail and distributes.
- j) Such other duties as may be assigned by the Bookkeeper.

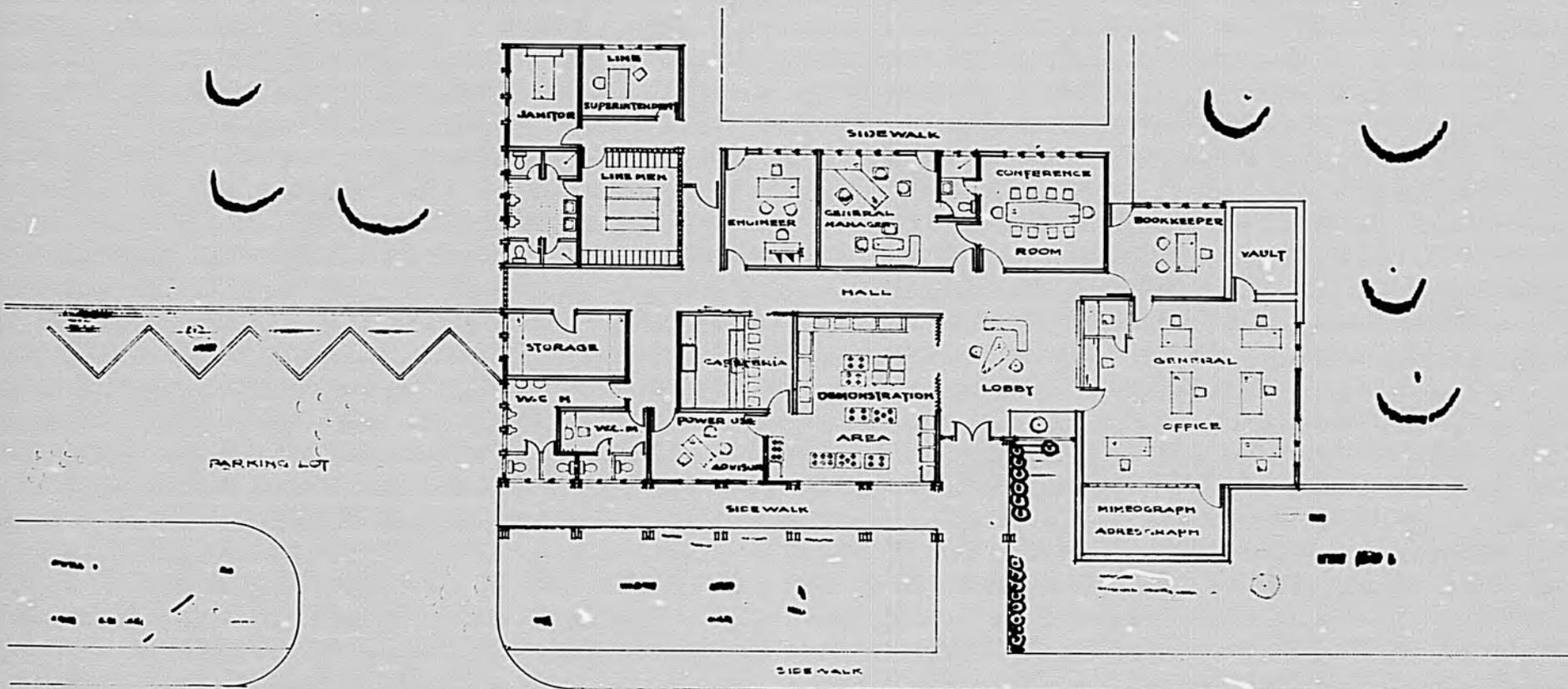
SUMMARY OF COOPERATIVE PERSONNEL AND EQUIPMENT NEEDS

	Rate <u>1st. year</u>	#	COOP. "E" TOTAL <u>Req'd COST</u>
A General Manager	50000	1	50000
A District Manager	35000		35000
S Power Use & Public Rel.	35000	1	35000
E Mgr. of Electric Opr.	35000	1	35000
C Office Manager	35000	1	35000
A Secretary	19000	1	19000
C Bookkeeper	24000	1	24000
C Clerk	10000	5	50000
A Guard-Custodian	7000	1	7000
C Meter Reader-Collector	10000	9	90000
S Power Use Teck	25000	2	50000
E Staking Engineer	17000	1	17000
E Superintendent (LF)	19000	1	19000
E Lineman	17000	6	102000
E Apprentice Lineman	12000	4	48000
E Groundmen-Drivers	9000	5	45000
E Warehouseman	10000	1	10000
E Labor	6000	4	24000
T O T A L		<u>45</u>	<u>695000</u>
<hr/>			
Total Administration		3	111000
Total Sales			85000
Total Office (c)			199000
Total Electric Opr.			300000
4-Wheel Drive Pick Up with Service Body & Winch	30000	5	150000
Jeep Station Wagon (4 W.)	20000	3	60000
Truck 3 ton. with Winch & Boom	45000	1	45000
Pole Trailer (Small)	1000	2	2000
Motor Bike	4000	10	40000
Car, Small	15000	1	15000
T O T A L			<u>347000</u>

Salary Increases of 5% per year to include additional personnel.

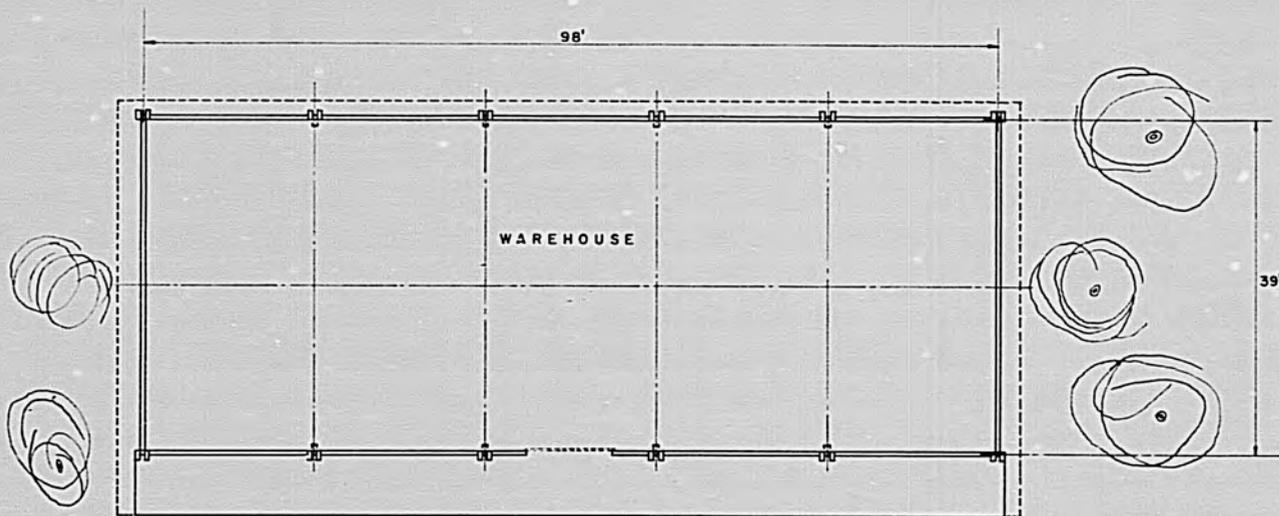


FRONT VIEW

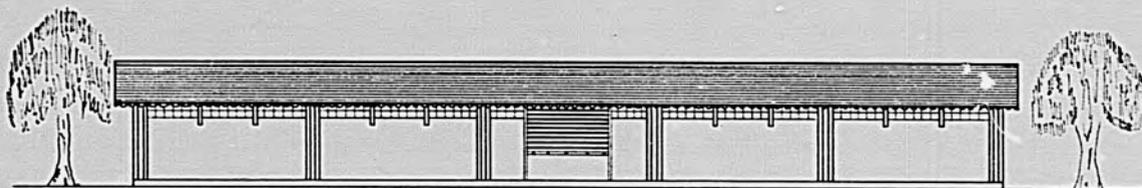


FRONT VIEW

ANTEPROYECTO OFICINAS
 COOPERATIVAS DE ELECTRIFICACION RURAL
 DISEÑADO POR EL INGENIERO EN ELECTRICIDAD E. J. ALA 1960

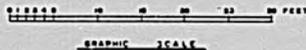


PLAN VIEW — SCALE 1:100
FLOOR AREA 4,300 SQ.-FT. = 400 SQ.-MT.



FRONT VIEW — SCALE 1:100

FINISHING SPECIFICATIONS		
DESCRIPTION	FLOOR	WALL
WAREHOUSE	REINFORCED-CONCRETE	PLASTER & FINE FINISH



GENERAL NOTES

1. — DESIGNATION: WAREHOUSE BUILDING
2. — LOCATION:

T O T A L

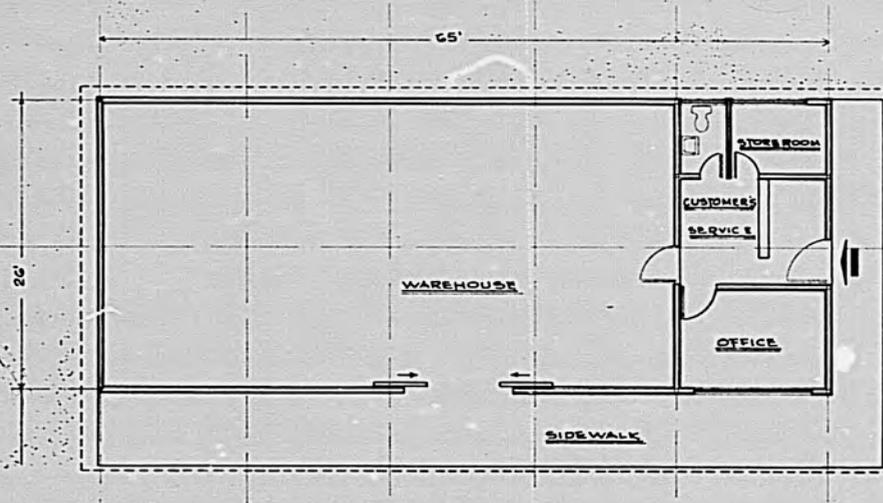
3. — FLOOR AREA: 4,300 SQFT (400 SQ.-MT.)
4. — TYPE OF CONSTRUCTION:
STRUCTURE: REINFORCED CONCRETE
WALLS : CEMENT BLOCKS WITH CEMENT PLASTER AND STUCCO FINISH
ROOF : STRUCTURAL STEEL TRUSSES OPEN WEB TYPE AND ASBESTOS
FLOOR : REINFORCED CONCRETE
VENTILATION : DECORATIVE CERAMIC BLOCKS
ROLLING DOOR: STEEL SHEET, MANUALLY OPERATED
5. — ESTIMATED COST : \$ 180,000 | U.S. 28,800

GENERAL NOTES

- 1.- DESIGNATION : WAREHOUSE AND OFFICE BUILDING A2,B2,C2
- 2.- LOCATION :

O C C O T A L

- 3.- FLOOR AREA : 1,915 SQ FT ≈ 178 SQ MT.
- 4.- TYPE OF CONSTRUCTION :
 STRUCTURE : REINFORCED CONCRETE.
 WALLS : CEMENT BLOCKS WITH CEMENT PLASTER AND STUCCO FINISH.
 ROOF : STRUCTURAL STEEL TRUSSES, OPEN WEB TYPE AND ASBESTOS
 FLOORS : WAREHOUSE : REINFORCED CONCRETE SLAB
 CEMENT-
 OFFICE : FLOOR TILE
 WINDOWS : OFFICE : ANODIZED ALUMINUM COUVERES AND GLASS
 WAREHOUSE : DECORATIVE CERAMIC BLOCK
 DOORS : OFFICE WOODEN FRAME AND PLYWOOD
 WAREHOUSE : STEEL SHEET (ROLLING DOOR) MANUALLY OPERATED
- 5.- ESTIMATED COST : C\$ 85,000 ≈ U.S. \$ 12,150
 • FOR OMETEPE ESTIMATED COST : C\$ 65,000 ≈ U.S. \$ 9,300



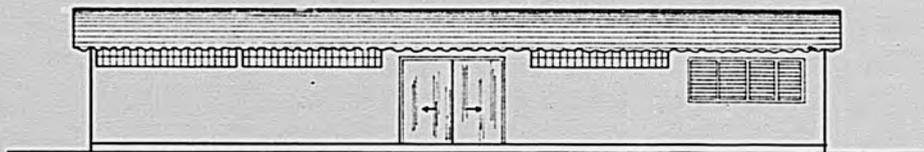
PLAN VIEW Scale 1:100

FLOOR AREA 1,915 SQ FT ≈ 178 SQ MT.

DESCRIPTION	FLOOR		WALL		CEILING	BASE
	FLOOR TILE	REINFORCED CONCRETE	PLASTER & FINISHED	GLAZED TILES	PLYWOOD PINE 3/4"	FLOOR TILE
OFFICE	•		•		•	•
W.C.	•		•	•	•	
STORE ROOM	•		•		•	
WAREHOUSE		•	•			
SIDEWALK		•				

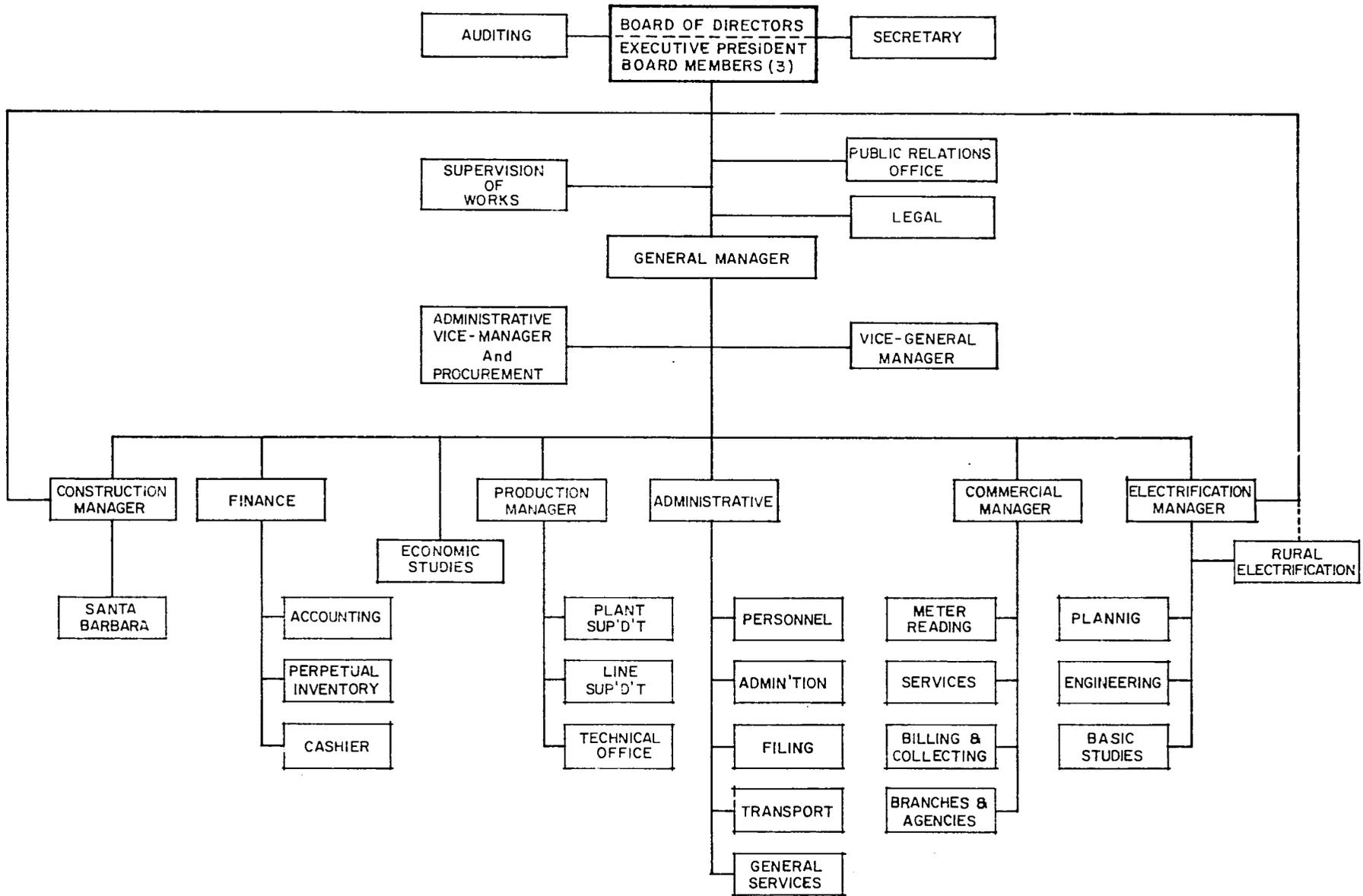


GRAPHIC SCALE

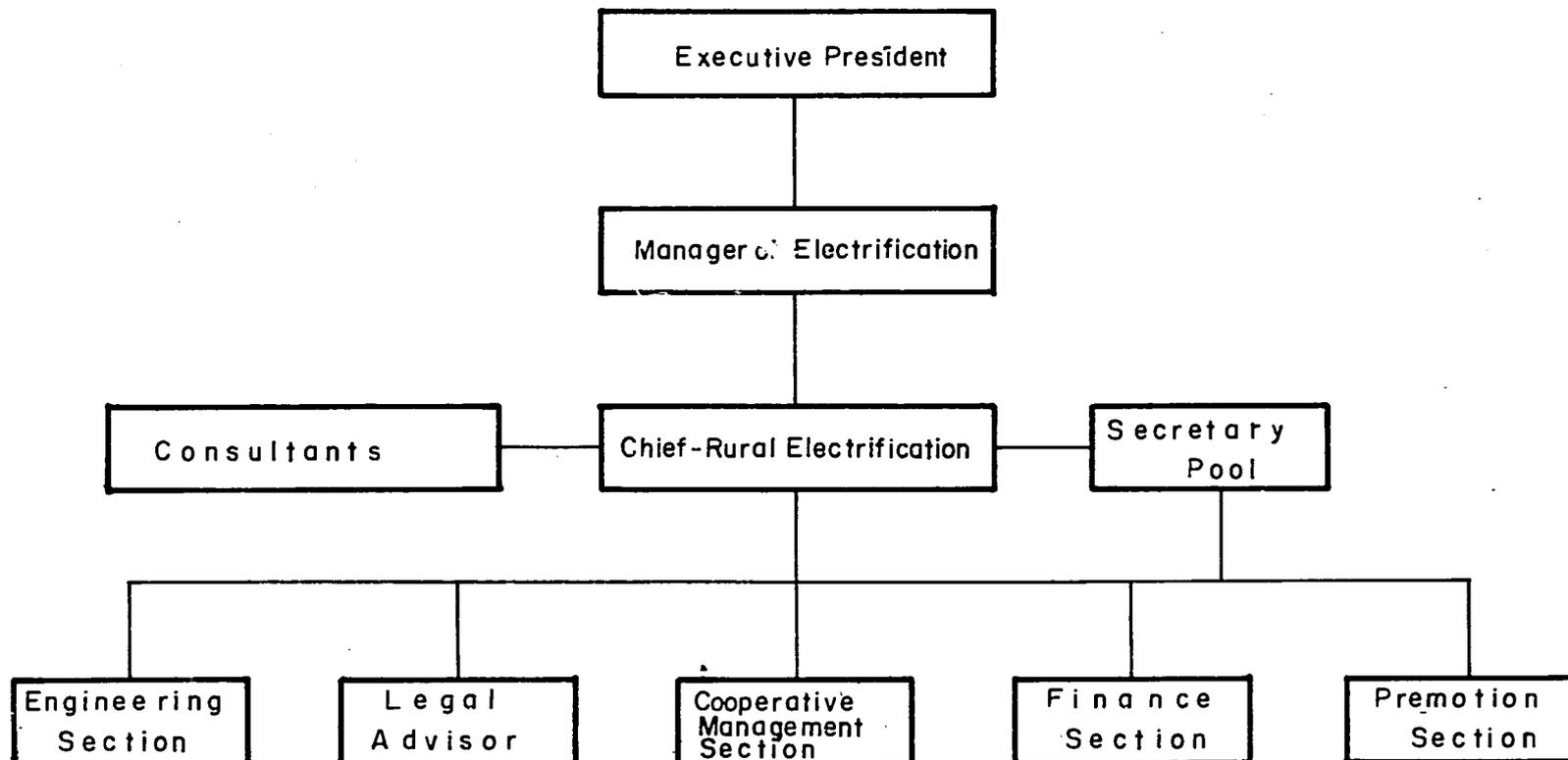


FRONT VIEW Scale 1:100

**EMPRESA NACIONAL DE LUZ Y FUERZA
NICARAGUA C.A.
ORGANIZATION CHART**



ENALUF DEPARTMENT OF RURAL ELECTRIFICATION ORGANIZATION CHART



BIOGRAPHIC INFORMATION ON PRINCIPAL ENALUF OFFICERS

DR. LUIS MANUEL DEBAYLE, Executive President of ENALUF

Born: May 24, 1894

Education Graduated from School of Medicine of U. of Pennsylvania in 1919
Obtained Master's degree in Public Health from John Hopkins U. in 1934.

Positions Held: First Director General of Public Health - 1925
Nicaraguan Consul in Baltimore, Md., - 1930
Chargé d'affaire a.i. of Nicaraguan Embassy in Washington, D.C., 1933
Minister of Foreign Relations of Nicaragua - 1936
Director General of Public Health, 1937
Member Executive Board of Pan American Health Office, Washington, D.C., 1941
Minister of Foreign Relations of Nicaragua, 1948
Senator of Nicaragua, 1950
President of the Senate and alternatively President of Congress, 1952
Nicaraguan Ambassador to the U.S. 1960/1966.

Conferences Attended: Nicaraguan Delegate to VI Commercial Conference in Washington, D.S.
Head of Nic. Delegation to Peace Conferences in Argentina, 1936
President of Nic. Delegation to Pan American Health Conferences in Colombia, 1938
Honor Guest at Meeting of American Association of Public Health, 1942
Delegate with rank of Ambassador to conferences on the organization of the U.N. in San Francisco, Calif. 1945
President of Nic. Delegation to IX Interamerican Conference in Colombia, 1948.
As Minister of Foreign Relations, Represented Pres. Nic. Delegation to U.N. Conference in Paris, France, 1948.

Major Publications: Political Works
Documents and Conferences "For Democracy"; "Political Reality of Nicaragua"; "A Propos the Central American Conferences"; "Defense of Liberalism"; "Panamericanism & Interamericanism"; "Liberalism & Socialism" "Towards a Social Medicine"; Cooperation & Solidarity of the Americas"; "Democracy & Communism"; "Mission & Importance of the United Nations"

Scientific Works

Several Documents of Abdominal Surgery
"First Medical Aid in Case of War".

RAMIRO LACAYO MONTEALEGRE – Representative of Private Enterprise in
the Executive Council of ENALUF

Born: June 22, 1914

Positions Held:

President of the following enterprises:

Combustibles & Lubricantes, S.A. (Fuel & Lubricators)
Azucarera Lacayo Montealegre, S.A. (sugar refinery)

Secretary Board of Director of Mañías Agrícolas (Agriculture)

Treasurer of Board of Directors of Envases Industriales
(Industrial Containers)

Director of Board of Maquinarias de Centro America (Machinery)

Member of National Board of Tourism of Nicaragua

FRANK ARANA VALLE - Representative of Minority Party (Conservative Party)
in the Executive Council of ENALUF.

Born: February 21, 1916

Education: Correspondence studies on Electronic Engineering in the field of
Radio Transmission and Reception

Positions Held:

Founder and Co-Owner of Nic. Chain of Broadcasters (Mundial Radio
Station)

Treasurer General of Conservative Party of Nicaragua since June 1966.

JORGE ARGUELLO BARRA

Born: January 22, 1916

Education: Chemical Engineer, National University of Mexico

Positions Held: Member of the Integration and Development Studies Commission
Ministry of Economy - 1959/62 - Ad Honorem.

Member of the Counseling Committee for the Industrial Technical
Cooperation Center of NEONAC - 1960/64 - Ad Honorem.

President of the Industrial Development Consulting Committee
Ministry of Economy - 1958/60

Member of the Board of Directors of Comisión Nacional de Energía
1958/60

Founding President of the Industrial Association of Nicaragua
1957/60 - Ad Honorem

Director of the Managua Chamber of Commerce and Industry -
1956/59 - Ad Honorem

Director of the Industrialist Association of Nicaragua - 1960/67
Ad Honorem

Member of the Nicaragua Productivity Center Committee
1965/67 - Ad Honorem

Positions Presently Held:

Member of the Board of Directors of Empresa Nacional de Luz y
Fuerza.

President and General Manager of Compañía Industrial Centroameri-
cana, S.A.

OCTAVIO SALINAS M. - General Manager of ENALUF

Born: April 24, 1926

Education: Electric Engineer - Catholic University of America, Washington, D.C., 1950
Special Studies in Administration - U. of Colorado - 1951

Positions Held:

Projection Engineer of Bureau of Reclamation (Hydroelectric Plants)
Denver, Colorado - 1951/52

Projection Engineer - Harza Engineering, Co. (Transmission Lines)
New York, U.S.A. 1953

Engineer in charge of linking Electric Projects of ENALUF
in the Pacific Zone of Nicaragua - 1954

Chief of Engineering & Planning Department of ENALUF - 1956

Vice Manager & Chief Engineer of ENALUF 1960/1966

General Manager of ENALUF since 1967

Professor at School of Engineering of Nat'l, Univ. of Nicaragua 1956/66

Professor at Central American University in Managua - 1964/66

Nicaraguan Coordinator for Interconnection Project between Nicaragua
and Costa Rica

Nicaragua Delegate to sub-committee for Central American Electrification.

EDUARDO ROMAN - Vice General Manager
Head of Financial Dept. of ENALUF

Born: May 5, 1937

Education: Lawyer's Degree of Autonomous Univ. of Guadalajara, Mexico, 1962
Lawyer's Degree from Aut. Univ. of Mexico 1963
Master's Degree in Economics, Indiana University, 1965
Completed studies required for Ph. D. pending only presentation of
Thesis for Granting Ph. D.
Business Administration course given by the Graduate School of
Business Administration of Harvard Univ. in Central America
Course on Management & Control of Inventories given by IBM Personnel
in Cuernavaca, Mexico 1967.
Course on Human Relations given by Banco Nacional de Nicaragua

Positions Held: Lawyer of various private enterprises among them Attorney for RANGO
S.A. - 1962/1963
Legal Assistant, Personnel & Public Relations Dept. of Banco Nacional
de Nic. - 1963
Chief, Financial Sect. of Banking Operations Dept. of Banco Nacional
de Nic. - 1967
In charge of Board of Director's Consultant Office at Banco Nacional
de Nic.

Conferences Attended:

Part of Nicaraguan Delegation before CIAP Sub-Committee in
Washington, D.C. - October 1966, representing Banco
Nacional de Nicaragua.

ALFREDO GUERRERO RUIZ -- Electrification Manager

Born: March 20, 1929

Education: B.S. in Civil Engineering from Loyola University in Los Angeles,
Calif. - 1952

Positions Held: Bureau of Reclamation of U.S. in-service-trainee in Hydrology,
Canals, Dams and Hydraulic Works - 1953-54

Chief Engineer Road Construction - Ministry of Public Works
Nicaragua - 1952-53

Director of National Energy Commission in Ministry of Public
Works - 1954/60

T U M A

Construction Manager of Hydroelectric Project of ENALUF -
1960/65

Head of Electrification Office of ENALUF since 1965

Conference Attended:

Congress on Large Dams, New York, 1958
Representing Ministry of Public Works - Nicaragua

MANUEL ANTONIO GUERRERO OBANDO

Born: December 16, 1929

Education: B.S. in Electrical Engineering from Columbia University in New York
N.Y.

Studies at NRECA and REA on Rural Electrification Administration and
also at University of Wisconsin

Positions Held:

Maintenance Engineer for ENALUF's substations and communication
Equipment 1958/61

Chief of Electrical Engineering Department of Energy Commission
1961/1966

Ex-Professor of Electronics at the Central American University,
Managua, Nicaragua

Ex-Professor of Physics and Mathematics at the National University
of Nicaragua

Delegate of National Energy Commission in Electrical Interconnection
between Nicaragua and Costa Rica.

National Energy Commission Delegate in Central American Committee
for Electric Regulations

Development Division of ENALUF and Chief of Rural Electrification
Section since 1967.

Conferences Attended:

III Conferencia de Electrificación Rural as ENALUF representative
Mexico D.F. 1969

NRECA Seminar in Louisville, Kentucky - ENALUF representative
1969

LEONTE VALLE LOPEZ

Born: May 3, 1922

Education: Lawyer's degree from Central University of Managua, 1945

Positions presently held:

Legal Advisor to ENALUF since February, 1961

Legal Advisor to INCEI (National Institute for External & Internal Commerce) since January 1964

Vice President of Administrative Council of "Caja Nacional de Crédito Popular" since October 1959.

Substitute Congress Representative and Substitute Judge of Supreme Court of Elections as Delegate of National Liberal Party

Private Law Office since 1945; Legal Advisor to several important private enterprises.

FRANCISCO EDGAR MACHADO ANDRADE

Born: April 29, 1942

Education: Electric Mechanical Engineer degree from Instituto Tecnológico de
Estudios Superiores de Monterrey, Mexico

Positions Held: ENALUF -- Engineering Department for 5 years

Presently:

Chief of the Engineering Department

FEDERICO KELLY

Born: August 10, 1941

Education: Globe Business College, St. Paul, Minnesota - concluded studies
in Accounting and Auditing

Training received from Federal Electric Commission of the United
States of Mexico in Organization, Installation and Control of
Warehouses and physical properties in public utilities.
(Electrical)

Positions Held: Assistant to Texaco Caribbean Co. - Controller (1 year)

Assistant to Banco Nacional de Nic. Advisor in Reorganization
of Accounting and Costs sections of Bank (1 year)

Auditor in C.P.A. firm, Donkin & Argüello (2½ years)

Internal Auditor of ENALUF for past 6½ years.

OSCAR GALLO

Born: June 10, 1940

Education: Electric-Mechanical Engineer Degree - Universidad
Centroamericana de Managua, Nicaragua

Position Held: Planning Office of ENALUF for the past four years.

PROFIT AND LOSS PROJECTIONS

Annex O

1 of 7

(COOPERATIVE "B")

Construction Ends

	4o. 1o.	2o.	3o.	4o.	5o.	6o.	7o.	8o.	9o.	10o.
<u>REVENUE ELECTRICITY SALES</u>										
Residential	2 328 090	3 159 122	4 003 163	4 838 521	5 688 577	6 496 661	7 275 124	8 059 358	8 800 695	9 529 395
Commercial	66 780	77 131	88 379	100 531	115 040	130 745	149 206	169 213	190 822	214 166
Industrial	1 076 447	1 118 768	1 149 686	1 194 284	1 225 312	1 263 329	1 298 154	1 341 912	1 396 167	1 425 560
Irrigation	219 356	262 178	293 410	318 785	353 473	395 047	435 729	479 427	528 105	579 346
Pumping	121 550	125 800	146 964	160 289	172 039	177 820	198 306	209 530	233 177	244 800
Government	52 272	56 628	67 010	72 673	86 370	93 654	110 328	118 290	135 762	143 167
<u>TOTAL REVENUE ELECTRICITY SALES</u>	3 864 495	4 799 627	5 748 612	6 685 083	7 640 811	8 557 256	9 466 847	10 377 730	11 284 728	12 136 384
<u>OTHER REVENUE</u>	46 374	57 596	68 983	80 221	91 690	102 687	113 602	124 533	135 417	145 637
<u>TOTAL REVENUE</u>	3 910 869	4 857 223	5 817 595	6 765 304	7 732 501	8 659 943	9 580 449	10 377 730	11 420 145	12 282 021
<u>EXPENDITURES</u>										
Energy Purchased	1 753 295	2 093 607	2 461 853	2 805 560	3 181 539	3 522 036	3 903 287	4 251 012	4 652 406	5 026 372
Transmission	270 515	270 515	270 515	270 515	270 515	270 515	270 515	270 515	270 515	270 515
Distribution	231 870	240 681	249 827	259 320	269 175	279 403	290 020	301 041	312 481	324 355
Consumer Accounts	309 160	324 618	340 849	357 891	375 786	394 575	414 304	435 019	456 770	479 609
Sales Promotion	77 290	81 309	85 537	89 985	94 664	99 587	104 765	110 213	115 944	121 973
Admin. & General	347 805	365 195	383 455	402 627	422 759	443 897	466 091	489 396	513 867	539 559
Rentals	57 967	55 069	52 316	50 694	49 122	47 600	46 124	44 694	43 309	41 966
<u>TOTAL OPERATIONS & MAINTENANCE</u>	3 047 902	3 430 994	3 844 352	4 236 592	4 663 560	5 057 613	5 495 106	5 901 894	6 365 292	6 804 349
Depreciation	1 045 129	1 054 129	1 063 129	1 069 129	1 075 129	1 078 129	1 084 299	1 090 129	1 093 129	1 102 129
<u>TOTAL INCLUDING DEPRECIATION</u>										
A) Net Income before Depreciation	862 967	1 426 229	1 973 243	2 528 712	3 068 941	3 602 330	4 085 343	4 475 836	5 054 853	5 477 672
B) Net Income after Depreciation	(182 162)	372 100	910 114	1 459 583	1 993 812	2 524 201	3 001 044	3 385 707	3 961 724	4 375 543
C) Interests	683 092	683 092	683 092	683 092	683 092	683 092	683 092	683 092	683 092	683 092
A-e Net Profits before Depreciation	179 875	743 137	1 290 151	1 845 620	2 385 849	2 919 238	3 402 251	3 792 744	4 371 761	4 794 580
B-e Net Profits after Depreciation	(865 254)	(310 992)	227 022	775 491	1 310 720	1 841 109	2 317 952	2 702 615	3 278 632	3 692 451
B-e Cumulatives	(865 254)	(1 176 246)	(949 224)	(172 733)	1 137 987	2 979 096	5 297 048	7 999 663	11 278 295	14 970 746

FLUJO DE FONDOS

Annex 0

(FLOW OF FUNDS)

2 of 7

COOPERATIVE "E"

	1o.	2o.	3o.	4o.	5o.	6o.	7o.	8o.	9o.	10o.
ORIGEN DE FONDOS (Sources of Funds)										
<u>GEN. INTERNA DE EFECTIVOS</u> (INTERNAL CASH GENERATION)										
INGRESO NETO ANTES DE INTERESES Y DEPRECIACION (Net Income before Interest and Depreciation)				862 967	1 426 229	1 973 243	2 528 712	3 068 941	3 602 330	4 085 343
<u>PRESTAMOS</u> (Borrowings)										
COSTOS LOCALES (Local Costs)	450 000	5 175 000	6 451 498	-	-	-	-	-	-	-
COSTOS DOLARES	140 000	15 280 000	7 358 055	-	-	-	-	-	-	-
TOTAL PRESTAMOS	590 000	20 105 000	13 459 553							
CONTRIBUC. DE COOPERADOS (Coop. Members Contribut.)	172 170	172 170	172 170	172 170	86 340	72 540	69 600	65 160	60 540	55 680
DEPOSITOS DE COOPERADOS (Coop. Members Depositi.)	154 953	154 953	154 953	154 953	77 706	65 286	62 640	58 644	54 486	50 112
OTRAS CONTRIBUCIONES (Other Contributions)	50 000	50 000	50 000	-	-	-	-	-	-	-
MENOS (AUMENTO) O DISMINUCION EN RECIBIBLES (Less (Increase) Decrease in Receivables)	-	-	-	(322 041)	(77 928)	(79 082)	(84 724)	(80 600)	(77 287)	(76 709)
TOTAL ORIGEN DE FONDOS (Total Sources of Funds)	967 123	20 832 123	14 186 676	868 049	1 512 347	2 031 987	2 576 228	3 112 145	3 640 069	4 114 426

FLUJOS DE FONDOS(FLOW OF FUNDS)COOPERATIVE "E"

	10.	20.	30.	40.	50.	60.	70.	80.	90.	100.
<u>APLICACION DE FONDOS</u> (Application of Funds)										
2 <u>GASTOS DE CONSTRUCCION</u> (Construction Expendit.)										
LINEAS TRANSMISION L/C (Transmission Lines) F/C	100 681 -	240 000 1 451 660	469 213 -							
LINEAS DISTRIBUCION L/C (Distrib. Lines) F/C	199 319	3 660 000 13 548 340	4 463 885 6 512 255	- -	90 000 210 000	90 000 210 000	60 000 140 000	60 000 140 000	30 000 70 000	- -
EDIFICIO, MUEBLES, TERRENOS, VEHICULOS, Y EQUIPO L/C (Building, Furnitures, Vehicles equipment) F/C		425 000	493 850	- -	- -	- -	- -	- -	30 000 70 000	30 000 70 000
ORGANIZAC.ADMON. PROMOCION L/C (Organization, administration and Promotion) F/C	150 000 140 000	500 000 280 000	674 550 280 000	- -	- -	- -	- -	- -	- 70 000	- 70 000
SUB-TOTAL L/C (Sub-Total) F/C	450 000 140 000	4 825 000 15 280 000	6 101 498 7 358 055							
TOTAL (1)	590 000	20 105 000	13 459 553							
2 <u>SERVICIO DE LA DEUDA</u> (Debt Service)										
INTERESES L/C (Interest) F/C	113 766 227 780	234 531 455 561	241 531 455 561	241 531 455 561	241 531 455 561	241 531 455 561	241 531 455 561	241 531 455 561	241 531 455 561	241 531 455 561
AMORTIZACIONES L/C (Amortization) F/C	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
TOTAL (2)	341 546	690 092	697 092	697 092	697 092	697 092	697 092	697 092	697 092	697 092
TOTAL APLIC. FONDOS L/C (Total Aplic. of Funds) F/C	563 765 367 781	5 059 531 15 735 561	6 343 029 7 813 616	241 531 455 561	331 531 665 561	331 531 665 561	301 531 595 561	301 531 595 561	301 531 595 561	271 531 525 561
GRAN TOTAL	931 546	20 795 092	14 156 645	697 092	997 092	997 092	897 092	897 092	897 092	797 092
EFFECTIVO AL PRINCIPIO DEL PERIODO (Cash at beginning of year)	-	35 577	72 618	102 649	273 606	788 857	1 823 752	3 502 888	5 717 941	8 460 918

FLUJOS DE FONDOS
(FLOW OF FUNDS)
COOPERATIVE "E"

Annex 0
4 of 7

	1o.	2o.	3o.	4o.	5o.	6o.	7o.	8o.	9o.	10o.
EFFECTIVO AL FINAL PERIODO (Cash at end of year)	35 577	72 618	102 649	273 606	788 857	1 823 752	3 502 888	5 717 941	8 460 918	11 778 252
EFFECTIVO ACUMULADO	35 577	72 618	102 649	273 606	788 857	1 823 752	3 502 888	5 717 941	8 460 918	11 778 252

BALANCE
(BALANCE SHEET)

Annex 0
5 of 7

<u>ACTIVO Y OTROS DEBITOS</u> (Assets and Other Debits)	4o.	5o.	6o.	7o.	8o.	9o.	10o.	11o.	12o.	13o.
A - ACTIVO FIJO (Fixed Assets)										
1 LINEAS TRANSMISION (Transm. Lines)	1 810 054	1 810 054	1 810 054	1 810 054	1 810 054	1 810 054	1 810 054	1 810 054	1 810 054	1 810 054
2 SUB-ESTACIONES (Sub-Stations)	451 500	451 500	451 500	451 500	451 500	451 500	451 500	451 500	451 500	451 500
3 LINEAS DISTRIBUCION (Distrib.Lines)	28 383 799	28 683 799	28 983 799	29 183 799	29 383 799	29 483 799	29 483 799	29 683 799	29 783 799	30 083 799
4 PLANTA GENERAL (General Plant)	3 509 200	3 509 200	3 509 200	3 509 200	3 509 200	3 609 200	3 709 200	3 709 200	3 709 200	3 709 200
5 INT. DUR. CONSTRUCC. (Int. During Const)	683 092	683 092	683 092	683 092	683 092	683 092	683 092	683 092	683 092	683 092
6 TRABAJO EN PROGRESO (Const. in Progress)	-	-	-	-	-	-	-	-	-	-
7 INTANGIBLES (Organization and (Intangibles) other intangible included in general plant)	-	-	-	-	-	-	-	-	-	-
TOTAL	34 837 645	35 137 645	35 437 645	35 637 645	35 837 645	36 037 645	36 137 645	36 337 645	36 437 645	36 737 645
MENOS: Less:										
RESERV. DEPREC. Y AMORT. (Provision for Deprec.)	1 045 129	2 099 258	3 162 387	4 231 516	5 306 646	6 384 775	7 468 904	8 559 033	9 652 162	10 754 291
TOTAL ACTIVO FIJO NETO (Net Fixed Assets)	33 792 516	33 038 387	32 275 258	31 206 129	30 530 999	29 552 870	28 668 741	27 778 612	26 785 483	25 983 354

BALANCE

Annex O
6 of 7

(BALANCE SHEET)

	4o.	5o.	6o.	7o.	8o.	9o.	10o.	11o.	12o.	13o.
B - <u>ACTIVO CIRCULANTE Y ACUMULADO</u> (Current and Accrued Assets)										
1 CAJA Y BANCOS (Cash)	273 606	788 857	1 823 752	3 502 888	5 717 941	8 460 918	11 778 252	15 135 190	19 048 321	22 976 498
2 CTAS. RECIB. CONSUM. (Customers Accoun. Rec.)	322 041	399 969	479 001	563 775	644 375	721 662	798 371	864 810	951 679	1 023 502
3 INVENTARIO: MAT Y SUM. (Inventory: Materials y Supplies)	1 059 628	1 073 632	1 087 632	1 301 632	1 122 149	1 242 203	1 161 601	1 434 024	1 796 072	2 374 443
TOTAL ACTIVO CORRIENTE (Total Current Assets)	1 655 275	2 262 458	3 390 435	5 368 295	7 484 465	10 424 783	13 738 224	17 434 024	21 796 073	26 374 443
TOTAL ACTIVO (Total Assets)	35 447 791	35 300 845	35 665 693	36 574 424	38 015 464	39 977 653	42 406 965	45 212 636	48 581 556	52 357 797

BALANCE
(BALANCE SHEET)

Annex 0
7 of 7

	4o.	5o.	6o.	7o.	8o.	9o.	10o.	11o.	12o.	13o.	
<u>PASIVO Y OTROS CREDITOS</u> (Liabilities and Other Credits)											
A - <u>CAPITAL</u> (Capital)											
1	CAP. APORT. P. COOP. (Paid in Patronage Capital)	688 680	775 020	847 560	917 160	982 320	1 042 860	1 098 540	1 152 780	1 200 300	1 244 400
2	DONACIONES (Donations)	150 000	150 000	150 000	150 000	150 000	150 000	150 000	150 000	150 000	150 000
3	SUPERAVIT O (DEFICIT) DESPUES DE DEPRECIACION (Earned surplus or deficit after Depr.)	(865 254)	(1 176 246)	(949 224)	(172 733)	1 137 987	2 979 096	5 297 048	7 999 663	11 278 295	14 970 746
TOTAL											
B -	<u>DEUDAS A LARGO PLAZO</u> (Long Term Debt)	34 854 553	34 854 553	34 854 553	34 854 553	34 854 553	34 854 553	34 854 553	34 854 553	34 854 553	34 854 553
C - <u>PASIVO CIRCULANTE Y ACUMULADO</u> (Current and Accrued Liabilities)											
	DEPOSITO CONSUMIDORES (Consumer Deposits)	619 812	697 518	762 804	825 444	890 604	951 144	1 006 624	1 055 640	1 098 408	1 138 098
TOTAL PASIVO CIRCULANTE (Total Currents Liabilities)											
	TOTAL PASIVO Y OTROS CREDITOS (Total Liabilities y other Credits)	35 447 791	35 300 845	35 665 693	36 574 424	38 015 464	39 977 653	42 406 965	45 212 636	48 581 556	52 357 797

COSTO DE LA ENERGIA COMPRADA
COST OF THE PURCHASED ENERGY

Annex P
Page 1 of 1

AÑO (YEAR)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<u>ENERGIA VENDIDA KWH</u> (Sold Energy)										
IRRIGACION (Irrigation)	1 798 000	2 149 000	2 405 000	2 612 995	2 897 322	3 238 092	3 571 551	3 929 727	4 328 730	4 748 739
OTROS SERVICIOS (Others)	11 528 600	13 764 918	16 107 684	18 429 000	20 755 097	22 955 500	25 205 238	27 423 449	29 704 924	31 736 924
TOTAL	13 326 600	15 913 918	18 512 684	21 041 995	23 652 419	26 193 592	28 776 789	31 353 176	34 033 654	36 485 663
<u>ENERGIA COMPRADA KWH</u> (Purchased Energy)										
IRRIGACION (Irrigation)	1 977 800	2 363 900	2 669 550	2 900 424	3 245 000	3 626 663	4 035 853	4 440 592	4 934 752	5 461 050
OTROS SERVICIOS (Others)	12 681 460	15 141 410	17 879 529	20 456 190	23 245 709	25 710 160	28 481 919	30 988 497	33 863 613	36 497 462
TOTAL	14 659 260	17 505 310	20 549 079	23 356 614	26 490 709	29 336 823	32 517 772	35 429 089	38 798 365	41 958 512
<u>COMPRAS ENERGIA ELECTRICA</u> (Purchased Energy)										
IRRIGACION (Irrigation)	168 113	200 931	226 912	246 536	275 825	308 266	343 047	377 450	419 454	464 189
OTROS SERVICIOS (Others)	1 585 192	1 892 676	2 234 941	2 557 024	2 905 714	3 213 770	3 560 240	3 873 562	4 232 952	4 562 183
TOTAL	1 753 295	2 093 607	2 461 853	2 805 560	3 181 539	3 522 036	3 903 287	4 251 012	4 652 406	5 026 372

PROGRAMA DE DESEMBOLSOS ANUALES PARA LA COOPERATIVA B

(Drawn Down Schedule)

No.	C O N C E P T O (Concept)	1 9 7 1		1 9 7 2		1 9 7 3	
		L/C (€)	F/C (€)	L/C (€)	F/C (€)	L/C (€)	F/C (€)
I	Administración (Administration)	150 000.00		500 000.00		674 550.00	
II	Ingeniería (Engineering)	300 000.00		900 000.00		901 960.00	
III	Materiales (Materials)				15 000 000.00		6 512 255.00
IV	Construcción (Construction)			3 000 000.00		4 031 138.00	
V	Vehículos y Equipo (Transportation & Equipment)					50 600.00	565 800.00
VI	Edificio, Muebles y Terreno (Buildings, Furniture & Lands)			425 000.00		443 250.00	
VII	NRECA		140 000.00		280 000.00		280 000.00
VIII	Materiales para las Coops. B,C Y D. (Material for Coops B,C & D)				7 000 000.00		
	TOTALES	450 000.00	140 000.00	4 825 000.00	22 280 000.00	6 101 498.00	7 358 055.00

CAPITAL COST AND INVESTMENT

No.	C O N C E P T	D E S C R I P T I O N	L/C (€)	F/C (€)	TOTAL €
I	<u>GENERAL</u>				
		a) Land Acquisition	50 000.00		50 000.00
		b) Administrative Building and warehouse	440 000.00		440 000.00
		c) Furniture and Equipment	65 000.00	35 000.00	100 000.00
		d) Transportation (Vehículos)	12 000.00	300 000.00	312 000.00
		e) Workshop	18 000.00	12 000.00	30 000.00
		f) Laboratory Equipment		40 000.00	40 000.00
		g) Tools and working Equipment	7 000.00	25 000.00	32 000.00
		h) Communication Equipment	7 000.00	80 000.00	87 000.00
	SUB-TOTAL €		599 000.00	492 000.00	1 091 000.00
II	<u>TRANSMISSION SYSTEM</u>				
		a) 69 KV Line (Yalagüina Sta. Clara)	521 360.00	1 040 760.00	1 562 120.00
		b) Santa Clara Substation	40 600.00	410 900.00	451 500.00
	SUB-TOTAL €		561 960.00	1 451 660.00	2 013 620.00
III	<u>DISTRIBUTION SYSTEM</u>				
		a) Clearing and right of way	200 000.00		200 000.00
		b) Poles and Hardware		5 882 187.00	5 882 187.00
		c) Conductors		2 008 363.00	2 008 363.00
		d) Labor (b+c)	4 063 439.00		4 063 439.00
		e) Transformers	408 753.00	4 005 885.00	4 414 638.00
		f) Services	427 482.00	1 632 032.00	2 059 514.00
		g) Meters	225 291.00	2 454 286.00	2 679 577.00
		h) Reclosers	10 062.00	284 975.00	295 037.00
		i) Inside House wiring	382 107.00	891 583.00	1 273 690.00
		j) Street lighting	34 939.00	95 335.00	130 274.00
	SUB-TOTAL €		5 752 073.00	17 254 646.00	23 006 719.00

CAPITAL COST AND INVESTMENT

No.	C O N C E P T	D E S C R I P T I O N	L/C (₱)	F/C (₱)	TOTAL ₱
IV	<u>MATERIALS FOR COOPS ABC Y D</u>			7 000 000.00	7 000 000.00
V	<u>ENGINEERING</u>		1 827 794.00		1 827 794.00
VI	<u>ADMINISTRATION (3.5%)</u>		977 870.00		977 870.00
VII	<u>CONTINGENCY (15%)</u>		1 457 805.00	2 879 745.00	4 337 550.00
VIII	ORGANIZING THE COOPS.		200 000.00		200 000.00
IX	NRECA			700 000.00	700 000.00
	TOTAL ₱		11 376 502.00	29 778 051.00	41 154 553.00

COOPERATIVE " E "

ESTIMATED UNITS REQUIRE-COST IN CORDOBAS

PRIMARY

<u>MILES</u>	<u>Ø</u>	<u>SIZE</u>	<u>SEC.</u>	<u>SPAN</u>	<u>MATER</u>	<u>COND.</u>	<u>LABOR</u>	<u>TOTAL</u>
14.51	3	3/0	No	500	163 049	154 169	114 005	431 223
48.96	3	1/0	No	500	550 163	332 389	339 587	1 222 139
68.32	3	4	No	500	724 465	224 226	381 840	1 330 531
43.15	3	4	Sí	300	704 337	141 618	357 584	1 203 539
19.53	1	4	No3	500	137 237	32 049	80 991	250 277
59.12	1	4	Sí	300	714 465	97 015	383 866	1 195 346
74.41	1	4	No	500	522 879	122 107	308 578	953 564
74.00	1	4	Sí	300	894 290	121 434	480 482	1 496 206
<u>8.00</u>	1	4	Sí	150	<u>193 352</u>	<u>26 256</u>	<u>103 896</u>	<u>323 504</u>
410					4 604 237 1	251 263	2 550 829	8 406 329

SECONDARY

30	3 Wires	1/0	150	252 750	166 830	300 030	719 610
40	3 Wires	2	150	337 000	147 440	352 000	836 440
60	3 Wires	4	150	505 500	147 720	462 000	1 115 220
90	V-2Wires	4	300	109 620	147 690	226 980	484 290
<u>60</u>	V-2Wires	2	300	<u>73 080</u>	<u>147 420</u>	<u>171 600</u>	<u>392 100</u>
280				1 277 950	757 100	1 512 610	3 547 660

COOPERATIVE " E "ESTIMATED UNITS REQUIRED - COST IN CORDOBAS

<u>TRANSFORMERS</u>		<u>MATER</u>	<u>LABOR</u>	<u>TOTAL</u>
2000	5 KVA-CSP	2 384 000	234 000	2 618 000
100	5 KVA-CNV	108 600	19 500	128 100
300	10KVA-CSP	398 100	38 100	436 200
120	10KVA-CNV	151 440	25 080	176 520
100	15KVA-CSP	166 000	13 600	179 600
40	15KVA-CNV	65 640	8 800	74 440
60	25KVA-CSP	120 780	9 360	130 140
25	25KVA-CNV	50 100	5 775	55 875
100	37.5KVA-CNV	263 700	26 400	290 100
76	50KVA-CNV	222 984	21 736	244 720
6	100KVA-CNV	28 338	2 904	31 242
3	167KVA-CNV	19 611	1 551	21 162
3	250KVA-CNV	26 592	1 947	28 539
		<u>4 005 885</u>	<u>408 753</u>	<u>4 414 638</u>

ESTIMATED UNITS REQUIRED - COST IN CORDOBAS

<u>SERVICES</u>	<u>MATERIAL</u>	<u>LABOR</u>	<u>TOTAL</u>
17594 - 2 wires - Residential	1 284 362	387 068	1 671 430
1487 - 3 wires - Residential	163 570	32 714	196 284
140 - 3Ø - Industrial	<u>184 100</u>	<u>7 700</u>	<u>191 800</u>
	1 632 032	427 482	2 059 514
 <u>METERS</u>			
17594 - 2 wires - Residential	2 164 062	193 534	2 357 596
1487 - 3 wires - Residential	196 284	16 357	212 641
140 - 3Ø - Industrial	<u>93 940</u>	<u>15 400</u>	<u>109 340</u>
	2 454 286	225 291	2 679 577
 <u>RECLOSERS</u>			
3 . 3Ø 100 Amps.	47 547	1 053	48 600
19 3Ø 50 Amps.	197 828	6 669	204 497
15 1Ø 50 Amps.	<u>39 600</u>	<u>2 340</u>	<u>41 940</u>
	284 975	10 062	295 037
11579* Inside house wiring	891 583	382 107	1 273 690
14.91 Street lighting	95 335	34 939	130 274

PROYECCIONES DE VENTAS
(SALES PROJECTION)

AÑO (Year)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<u>RESIDENCIAL (Residential)</u>										
Total KWH	5 516 800	7 486 070	9 486 168	11 465 690	13 480 040	15 394 932	17 239 630	19 098 005	20 854 728	22 581 504
No. de Clientes	9 304	10 598	11 725	12 841	13 915	14 949	15 929	16 912	17 811	18 657
KWH/Clientes	593	706	809	893	969	1 020	1 082	1 129	1 171	1 210
Sub-Total Ventas \$ (0.42.2/KWH)	2 328 090	3 159 122	4 003 163	4 838 521	5 688 577	6 496 661	7 275 124	8 059 358	8 800 695	9 529 395
<u>COMERCIAL (Commercial)</u>										
Total KWH	210 000	242 550	277 920	316 134	361 760	411 148	469 200	532 116	600 068	673 320
No. de Clientes	60	66	72	78	85	92	100	108	116	124
KWH/Clientes	3 500	3 675	3 860	4 053	4 256	4 469	4 692	4 927	5 173	5 430
Sub-Total Ventas \$ (0.318\$/KWH)	66 780	77 131	88 379	100 531	115 040	130 745	149 206	169 213	190 822	214 116
<u>INDUSTRIAL</u>										
Total KWH	4 870 800	5 062 300	5 202 200	5 404 000	5 544 400	5 716 420	5 874 000	6 072 000	6 317 500	6 450 500
No. de Clientes	66	71	76	80	83	86	89	92	95	97
KWH/Clientes	73 800	71 300	68 450	67 550	66 800	66 470	66 000	66 000	66 500	66 500
Sub-Total Ventas \$ (0.221\$/KWH)	1 076 447	1 118 768	1 149 686	1 194 284	1 225 312	1 263 329	1 298 154	1 341 912	1 396 167	1 425 560
<u>GOBIERNO (Government)</u>										
Total KWH	216 000	234 000	276 900	300 300	356 900	287 000	455 900	488 800	561 000	591 600
No. de Clientes	36	36	39	39	43	43	47	47	51	51
KWH/Clientes	6 000	6 500	7 100	7 700	8 300	9 000	9 700	10 400	11 000	11 600
Sub-Total Ventas \$ (0.242\$/KWH)	52 272	56 628	67 010	72 673	86 370	93 654	110 328	118 290	135 762	143 167
<u>BOMBEO (Pumping)</u>										
Total KWH	715 000	739 998	864 496	942 876	1 011 997	1 046 000	1 166 508	1 232 520	1 371 628	1 440 000
No. de Clientes	13	14	16	18	19	20	21	22	23	24
KWH/Clientes	55 000	52 857	54 031	52 382	53 263	52 300	55 548	56 024	59 636	60 000
Sub-Total Ventas \$ (0.170\$/KWH)	121 550	125 800	146 964	160 289	172 039	177 820	198 306	209 530	233 177	244 800
<u>IRRIGACION (Irrigation)</u>										
Total KWH	1 798 000	2 149 000	2 405 000	2 612 995	2 897 322	3 238 092	3 571 551	3 929 727	4 320 730	4 748 739
No. de Clientes	21	28	33	35	37	39	41	43	45	47
KWH/Clientes	85 619	76 750	72 879	74 657	78 306	83 028	87 111	91 389	96 194	101 037
Sub-Total Ventas \$ (0.122\$/KWH)	219 356	262 178	293 410	318 785	353 473	395 047	435 729	479 427	528 105	579 346
<u>TOTALES (Totals)</u>										
TOTAL KWH	13 326 600	15 913 918	18 512 684	21 041 995	23 652 419	26 193 592	28 776 789	31 353 176	34 033 654	36 485 663
TOTAL No. DE CLIENTES	9 500	10 813	11 961	13 091	14 182	15 229	16 227	17 224	18 141	19 000
TOTAL KWH/CLIENTES	1 403	1 472	1 548	1 607	1 668	1 720	1 773	1 820	1 876	1 920
TOTAL DE VENTAS \$ (Total Sales)	3 864 495	4 799 627	5 748 612	6 685 083	7 640 811	8 557 256	9 466 847	10 377 730	11 284 729	12 136 384

DEMANDAS MAXIMAS PARA LA COOPERATIVA "A"

PROJECTED PEAK DEMANDS

A Ñ O (YEAR)	ENERGIA (ENERGY) KWH	DEM. MAX. TOTAL (KW) (PEAK)	DEM. MAX. YALAGUINA (KW) (PEAK)	DEM. MAX. SANTA CLARA (KW)
1974	14 659 260	4 650	3 370	2 030
1975	17 505 310	5 400	3 910	2 350
1976	20 549 079	6 173	4 470	2 690
1977	23 356 614	6 837	4 950	3 000
1978	26 490 709	7 560	5 470	3 300
1979	29 336 823	8 170	5 915	3 560
1980	32 517 772	8 840	6 400	3 850
1981	35 429 089	9 406	6 810	4 100
1982	38 798 365	10 066	7 290	4 390
1983	41 958 512	10 644	7 710	4 640

VOLTAGE DROP SHEET ANNEX U 3 OF 4	SYSTEM DESIGNATION	SUBSTATION	SYSTEM DESIGN
	SYSTEM ENGINEER	CIRCUITS	DATE

SECTION		L O A D									L I N E					KW MILES	VOLTAGE DROP		AT POINT	
		CONSUMERS						CONCENTRATED			TOTAL KW	CONDUCTOR SIZE CU EQUIV.	Φ	KV	VOLTAGE DROP FACTOR		LENGTH OF SECTION IN MI	THIS SECTION		TOTAL
		WITHIN THIS SECTION	BEYOND THIS SECTION	EQUIV. THIS SECTION	KWH PER MONTH	PEAK KW	WITHIN THIS SECTION	BEYOND THIS SECTION	EQUIV. THIS SECTION	8										
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
					100								14.4							
1-3	B1-4	166	0	83	100	34.6				34.6	6	1	14.4	1.84	8.06	279	0.51	6.44		
1-2	B1-3	255	166	294	100	107				107	6	1	14.4	1.84	6.22	665	1.22	5.93		
1-2	B1-21	415	0	208	100	78.7				78.7	6	1	14.4	1.84	9.30	732	1.35	6.06		
1-1	B1-2	285	836	979	100	344.6				344.6	6	3	14.4	0.507	4.65	1602	0.81	4.71		
t	B1-1	4.118			100		240													
1-13	B1-14	324	0	162	100	62.7				62.7	6	1	14.4	1.84	7.75	486	0.89	7.92		
t	B1-13	147			100		4													
1-12	B1-13	454	471	698	100	247	828	4	418	665	2	3	14.4	0.241	10.23	6803	1.64	7.03		
t	B1-12	202			100		40													
1-1	B1-12	376	1.127	1.315	100	459		872	872	1.331	2	3	14.4	0.241	4.65	6189	1.49	5.39		
1(s)	B1-1	591	6.742	1.037	100	2449		1.112	1.112	3.561	1/0	3	14.4	0.176	6.22	22149	3.9	3.9		
4	B5	573	0	286	100	105	218	0	109	214	6	3	14.4	0.507	8.68	1857	0.94	6.91		
t	B4	563					76.5													
2	B4	136	1.136	398	100			295	295	693	4	3	14.4	0.345	7.1	4920	1.7	5.97		
t	B2-1	550			100		168							0.241						
2'	B2-1	100	550	600	100	213	150	168	243	456	6	3	14.4	0.507	10.85	4948	2.5	7.33		
2'	B2-2	208	0	104	100	42	109	0	54	96	6	3	14.4	0.507	7.75	744	0.38	5.21		
3	B3-1	426	0	213	100	80.4				80.4	6	1	14.4	1.84	12.4	997	1.83	6.88		
t	B3	1.172			100															
2	B3	219	1.598	1.707	100	594				594	2	3	14.4	0.241	5.44	3231	0.78	5.05		
t	B2'	465			100		116.5													
2	B2'	50	1.323	1.348	100	470		543	543	1.013	4	3	14.4	0.345	1.6	1.621	0.56	4.83		
1()	B2	368	4.462	4.646	100	1.617		846	846	2.460	2	3	14.4	0.241	7.2	17.734	4.27	4.27		

COOPERATIVE BASE

BASE COST PER MILE - LABOR

PRIMARY

<u>SPAN</u>	<u>Ø</u>	<u>SIZE</u>	<u>\$</u>
500'	3	3/OACSR	7 143.00
500'	3	1/OACSR	6 305.00
500'	3	2 ACSR	6 000.00
500'	3	4 ACSR	5 081.00
300'	3	3/OACSR	9 145.00
300'	3	1/OACSR	8 758.00
300'	3	2 ACSR	8 000.00
300'	3	4 ACSR	7 534.00
500'	1	1/OACSR	4 283.00
500'	1	2 ACSR	4 000.00
500'	1	4 ACSR	3 770.00
300'	1	1/OACSR	6 375.00
300'	1	2 ACSR	6 200.00
300'	1	4 ACSR	5 903.00

SECONDARY

150'	3h	1/OACSR	9 092.00
300'	2h	1/OACSR	3 046.00
300'	2h	4 ACSR	2 293.00
300'	3h	1/OACSR	6 278.00
300'	3h	4 ACSR	5 149.00

COSTOS UNITARIOS BASE

<u>PRIMARIO</u>	<u>MATER</u>	<u>COND.</u>	<u>M. de O.</u>	<u>TOTAL</u>
4.4/24.9KV				
00' Claro-1/OACSR-3Ø - No.Sec.	10 215	6 172	6 305	22 692
00' Claro-2ACSR-3Ø - No.Sec.	9 640	4 097	6 000	19 737
00' Claro-4ACSR-3Ø - No.Sec.	9 640	2 984	5 081	17 705
00' Claro-1/OACSR-3Ø No.Sec.	15 206	6 172	8 758	30 136
00' Claro-2ACSR-3Ø No. Sec.	14 839	4 097	8 000	26 936
00' Claro-4ACSR-3Ø No. Sec.	14 839	2 984	7 534	25 357
00' Claro-1/OACSR-1Ø No.Sec.	6 388	3 370	4 283	14 041
00' Claro-2ACSR-1Ø No.Sec.	6 388	2 234	4 000	12 622
00' Claro-4ACSR-1Ø No.Sec.	6 388	1 492	3 770	11 650
00' Claro-1/OACSR-1Ø No.Sec.	10 986	3 370	6 375	20 731
00' Claro-2/ACSR-1Ø No.Sec.	10 986	2 234	6 200	19 420
00' Claro-4ACSR-1Ø No.Sec.	10 986	1 492	5 903	18 381
<u>SECUNDUARIO</u>				
00' Claro-1/OACSR-3hilos-Post.	4 240	5 055	6 278	15 574
00' Claro-2ACSR-3 hilos-Post.	4 240	3 351	5 800	13 391
00' Claro-4ACSR-3 hilos-Post.	4 240	2 238	5 149	11 628
50' Claro-1/OACSR 3hilos-Post.	7 659	5 055	9 092	21 806
50' Claro-2ACSR 3 hilos Post.	7 659	3 351	8 000	19 010
50' Claro-4ACSR 3 hilos-Post.	7 659	2 238	7 000	16 897
<u>UNDERBUILD</u>				
00' Claro 1/OACSR 2 hilos	1 107	3 370	3 046	7 523
00' Claro 2 ACSR 2 hilos	1 107	2 234	2 600	5 941
00' Claro 4 ACSR 2 hilos	1 107	1 492	2 293	4 892

COOPERATIVE "E"

Annex V
3 of 23

UNIT COST OF LINES AND EQUIPMENT

<u>PRIMARY</u> 14.4/24.9KV	<u>110%</u> <u>MAT.</u>	<u>110%</u> <u>COND.</u>	<u>110%</u> <u>LABOR</u>	<u>TOTAL</u>
500' span 3/OACSR 3Ø	11 237	10 625	7 857	29 719
" " 1/0 " "	11 237	6 789	6 936	24 962
" " 2 " "	10 604	4 507	6 600	21 711
" " 4 " "	10 604	3 282	5 589	19 475
300' span 1/OACSR 3Ø	16 727	6 789	9 634	33 150
" " 2 " "	16 322	4 507	8 800	29 630
" " 4 " "	16 323	3 282	8 287	27 892
500' span 1/OACSR 1Ø	7 027	3 707	4 711	15 445
" " 2 " "	7 027	2 457	4 400	13 884
" " 4 " "	7 027	1 641	4 147	12 815
300' span 1/OACSR 1Ø	12 085	3 707	7 013	22 805
" " 2 " "	12 085	2 457	6 820	21 362
" " 4 " "	12 085	1 641	6 493	20 219
<u>SECONDARY</u>				
(Including Poles)				
300' span 1/OACSR 3 wires	4 664	5 561	5 906	17 131
" " 2 " "	4 664	3 686	6 380	14 730
" " 4 " "	4 664	2 362	5 664	12 790
150' span 1/OACSR 3 wires	8 425	5 561	10 001	23 987
" " 2 " "	8 425	3 686	8 800	20 911
" " 4 " "	8 425	2 462	7 700	18 587
<u>UNDERBUILD</u>				
300' span 1/OACSR 2 wires	1 218	3 707	3 351	8 276
" " 2 " "	1 218	2 457	2 860	6 535
" " 4 " "	1 218	1 641	2 522	5 381

COOPERATIVE "E"

UNIT COST OF LINES AND EQUIPMET

<u>PRIMARY</u>	<u>110% MATERIAL</u>	<u>110% CONDUCT.</u>	<u>110% LABOR</u>	<u>TOTAL</u>
150' span 1/OACSR 3Ø	33 453	13 622	19 268	66 343
150' span 2ACSR 3Ø	32 646	9 013	17 600	59 259
150' span 4ACSR 3Ø	32 646	6 565	16 575	55 786
150' span 1/OACSR 1Ø	24 169	7 414	15 125	46 708
150' span 2ACSR 1Ø	24 169	4 915	13 640	42 724
150' span 4ACSR 1Ø	24 169	3 282	12 987	40 438

BASE COST UNIT COST OF LINES

<u>PRIMARY</u>	<u>MATERIAL</u>	<u>CONDUCT.</u>	<u>LABOR</u>	<u>TOTAL</u>
150' span 1/O ACSR 3Ø	30 412	12 384	17 516	60 312
150' span 2 ACSR 3Ø	29 678	8 194	16 000	53 872
150' span 4 ACSR 3Ø	29 678	5 968	15 068	50 714
150' span 1/OACSR 1Ø	21 972	6 740	13 750	42 462
150' span 2 ACSR 1Ø	21 972	4 468	12 400	38 840
150' span 4 ACSR 1Ø	21 972	2 984	11 806	36 762

COOPERATIVE BASE

COST OF TRANSFORMERS WITH LIGHTNING ARRESTER & CUTOUT

<u>1 ∅ KVA</u>	<u>\$/UNIT</u>	<u>\$/UNIT</u>	<u>\$/TRANSFORMER</u>
5CSP	150.32	1075 + 9	1084
5CONV.	109.37	782 + 205	987
10CSP	167.41	1197 + 9	1206
10 ⁵ CONV.	131.63	942 + 205	1147
15CSP	209.72	1500 + 9	1509
15CONV.	179.93	1287 + 205	1492
25CSP	254.69	1821 + 9	1830
25CONV.	226.16	1617 + 205	1822
37CONV.	306.56	2192 + 205	2397
50CONV.	344.35	2462 + 205	2667
100CONV.	571.90	4089 + 205	4294
164CONV.	802.57	5738 + 205	5943
250CONV.	1098.3	7853 + 205	8058
FUSE	1.23	8.80	9
Cutout and arrester	27.40	196 + 9	205
Combinat			

COOPERATIVE "BASE"

UNIT COST

TRANSFORMERS - CSP AND CONVENTIONALS WITH EXTERNAL LIGHTNING

ARPESTER & CUTOOUT

	<u>MATERIAL</u>	<u>LABOR</u>	<u>TOTAL</u>
1Ø 5KVA CSP	1 084	106	1 190
1Ø 5KVA CONV.	987	177	1 164
1Ø 10KVA CSP	1 206	115	1 321
1Ø 10KVA CONV.	1 147	190	1 337
1Ø 15KVA CSP	1 509	124	1 633
1Ø 15KVA CONV.	1 492	200	1 692
1Ø 25KVA CSP	1 830	142	1 972
1Ø 25KVA CONV.	1 822	210	2 032
1Ø 37.5KVA CONV.	2 397	240	2 637
1Ø 50KVA CONV.	2 667	260	2 927
1Ø 100KVA CONV.	4 294	440	4 734
1Ø 167KVA CONV.	5 943	470	6 413
1Ø 250KVA CONV.	8 058	590	8 648

COOPERATIVE " E "UNIT COST OF LINES AND EQUIPMENT

Transformadores (Including external lightning arrester & cutout)

<u>DESCRIPCION</u>	<u>110% MATERIAL</u>	<u>110% LABOR</u>	<u>TOTAL</u>
1Ø 5 KVA CSP	1 192	117	1 309
1Ø 5KVA CONV.	1 086	195	1 281
1Ø 10KVA CSP	1 327	127	1 454
1Ø 10KVA CONV.	1 262	209	1 471
1Ø 15KVA CSP	1 660	136	1 796
1Ø 15KVA CONV.	1 641	220	1 861
1Ø 25KVA CSP	2 013	156	2 169
1Ø 25KVA CONV.	2 004	231	2 235
1Ø 37.5 CONV	2 637	264	2 901
1Ø 50KVA CONV.	2 934	286	3 220
1Ø 100KVA CONV.	4 723	484	5 207
1Ø 167KVA CONV.	6 537	517	7 054
1Ø 250KVA CONV.	8 864	649	9 513

COOPERATIVE BASECONSTRUCTION UNIT BASE PRICE

REA UNIT		MATERIAL	(CIFx7.08)
<u>POSTES</u>	U.S. \$ <u>CIF-P. SOMOZA</u>	<u>¢</u>	
25-7	21.80	154.00	
30-6	33.16	235.00	
35-5	56.32	399.00	
40-5	79.41	562.00	
<u>CONDUCTORES</u>		<u>¢/MILLA</u>	(+ 5% Sag-CIFx7.15)
3/0 ACSR	220.2/K1m.	2 658.00	
1/0 ACSR	139.6/K1m.	1 685.00	
2 ACSR	92.5/K1m.	1 117.00	
4 ACSR	61.8/K1m.	746.00	
<u>UNIDADES</u>			(CIFx7.15)
VA1	6.30	45.00	
VA2	12.33	88.00	
VA3	13.60	98.00	
VA4	23.72	170.00	
VA5	11.52	82.00	
VA6	20.92	150.00	
VC1	24.81	178.00	
VC2	48.57	347.00	
VC3	37.20	266.00	
VC4	69.78	499.00	
VC7	50.71	363.00	
VC8	84.70	606.00	

COOPERATIVE BASE
CONSTRUCTION UNIT BASE PRICE

<u>REA UNIT</u>		<u>MATERIAL</u>
		⌘
VE1-2	5.66	41.00
VE6-2x	10.93	78.00
VE7-2LX	14.30	102.00
VE8x2LX	18.61	133.00
VE12X	12.18	87.00
VE12-XX	18.08	129.00
VE2-2	5.39	39.00
F1-2	3.61	26.00
VF1-3	4.66	33.00
VF1-4	4.66	33.00
VM2-11	3.18	23.00
M2-12	5.86	42.00
j5	1.00	7.15
j6	1.30	9.30
j10	1.04	7.45
K15C	1.05	7.50

BASE COST PER MILE 14.4/24.9 KV - 3Ø 4 WIRE - 500' SPAN

<u>QTY</u>	<u>DESC.</u>	<u>\$/UNIT</u>	<u>MATERIAL</u>
4	35-5	335	1340
6	40-5	399	2394
1	45-4	562	562
5	VC1	178	890
3	VC2	347	1041
1	VC3	266	266
1	VC4-1	499	499
1	VC8	606	606
11	VM2-12	42	462
11	VM10-15	10	110
4	VE1-2	41	164
11	VE7-21x-	102	102
1	VE12xx	129	129
47	F1-4	33	1551
27	Bv	3	81
9	bv	2	18
<u>SUB-TOTAL</u>			10,215.00

CONDUCTOR

3.0 1/0 - 1685 - 5.055	3.0 3/0 - 2658 - 7.974
1.0 2 - <u>1117 - 1.117</u>	1.0 1/0 - <u>1685 - 1.685</u>
SUB-TOTAL 6.172	SUB-TOTAL 9.659
LABOR <u>6.305</u>	LABOR <u>7.143</u>
TOTAL 22.692	TOTAL 27.017

BASE COST PER MILE 14.4/24.9 KV - 3Ø 4 WIRE - 500' SPAN

<u>QTY</u>	<u>DESC.</u>	<u>\$/UNIT</u>	<u>MATERIAL</u>
4	35-5	335	1340
6	40-5	399	2394
1	45-4	562	562
6	VC1	178	1068
2	VC2	347	694
1	VC3	266	266
1	VC4-1	499	499
11	VM2-12	42	462
11	VM10-15	10	110
4	VE1-2	41	164
1	VE6-2x	78	78
1	VE12xx	129	129
46	F1-2	26	1196
27	bv	2	54
9	bv	2	18
<u>SUB-TOTAL</u>			9,640.00

<u>CONDUCTOR</u>		<u>CONDUCTOR</u>	
3 M. 2 ACSR - 1117 -	3.351.00	4 M. - 4 ACSR - 746.00	2.984.00
1 M. 4 ACSR - 746 -	<u>746.00</u>	LABOR	<u>5.081.00</u>
<u>SUB-TOTAL</u>	4.097.00	<u>TOTAL</u>	17.705.00
LABOR	<u>6.000.00</u>		
<u>TOTAL</u>	19.737.00		

COSTO BASE POR MILLA - 14.41CV - 1Ø - 500% SPAN

<u>CANTIDAD</u>	<u>DESCRIPCION</u>	<u>\$/UNIDAD</u>	<u>1/Ø ACSR \$</u>
4	35-5	335	1340
6	40-5	399	2394
1	45-4	562	562
5	VA1	45	225
3	VA2	88	264
1	VA3	98	98
1	VA4	170	170
1	VAG	150	150
11	VM2-12	42	462
11	VM10-14	6	66
9	VE 1-2	41	369
9	VF1-2	26	234
18	bv	3	54
<hr/>			
SUB-TOTAL			6.388

CONDUCTORES

2M 1 1/Ø ACSR - 1685 ±	3 370.00
Mano de Obra	<u>4 283.00</u>
TOTAL	<u><u>14 041.00</u></u>
2 M-2ACSR - 1117 -	2 234.00
Mano de Obra	<u>4 000.00</u>
TOTAL	<u><u>12 622.00</u></u>
2 M - 4 ACSR - 746	1 492.00
Mano de Obra	<u>3 770.00</u>
TOTAL	<u><u>11 650.00</u></u>

COSTO BASE POR MILLA - 3 Ø - 4 HILOS-300' SPAN

<u>CANT.</u>	<u>DESC.</u>	<u>\$/UNIDAD</u>	<u>MATER</u>		<u>\$/UNIDAD</u>	<u>MATER</u>
4	35-5	335	1340	4 35-5	-	1340
8	40-5	399	3192	8 40-5	-	3192
6	45-4	562	3372	6 45-4	-	3372
10	VC1	178	1780	10 VC1	-	1780
4	VC2	347	1388	4 VC2	-	1388
2	VC3	266	532	2 VC3	-	532
1	VC4-1	499	499	1 VC4-1	-	499
1	VC8	606	606	1 VC8	-	606
18	VM2-12	42	756	18 VM2-12	-	756
18	VM10-15	10	180	18 VM10-15	-	180
7	VE1-2	41	287	7 VE1-2	-	287
4	VE7-2LX	102	408	4 VE6-2x	78	312
1	VE12xx	129	129	1 VE 12xx	-	129
17	F1-4	33	561	13 F1-2	26	338
48	bv	3	144	48 bv	2	96
16	bv	2	32	16 bv	2	32
SUB-TOTAL			15.206	SUB-TOTAL		14.839

CONDUCTORES

3 Millas - 1/0 ACSR	1685 - 5 055	3 M. 2 ACSR - 1117	- 3 351	
1 Milla - 2 ACSR	1117 1 117	1 M. 4 ACSR - 746	746	
SUB-TOTAL		6 172	SUB-TOTAL	4 097
MANO DE OBRA	8 758	MANO DE OBRA	8 000	
TOTAL	30 136	TOTAL	26 936	

CONDUCTOR

4 Millas - 4 ACSR - 746	2 984
MANO DE OBRA	7 534
TOTAL	25 357.00

COSTO BASE POR MILLA - 14.4 2 HILOS 300' SPAN

<u>CANTIDAD</u>	<u>DESCRIPCION</u>	<u>\$/UNIDAD</u>	<u>MATERIALES</u>
4	35-5	335	1340
8	40-5	399	3192
6	45-4	562	3372
10	VA1	45	450
4	VA2	88	352
2	VA3	98	196
1	VA4	170	170
1	VA6	150	150
18	Vm2-12	42	756
18	VM10-14	6	108
12	VE1-2	41	492
12	VF1-2	26	312
32	bv	3	96
<hr/>			
SUB-TOTAL			10.986

2 M - 1/0 ACSR - 1685 - 3 370

Mano de Obra 6 375
TOTAL 20 731

2 M 2 ACSR - 1117 - 2 234

Mano de Obra 6 200
TOTAL 19 420

2 M - 4 ACSR - 746 1 492

Mano de Obra 5 903
TOTAL 18 381

COSTO BASE POR MILLA SECUNDARIA -300' CLARO - 3 HILOS

<u>CANTIDAD</u>	<u>DESCRIPCION</u>	<u>\$/UNIDAD</u>	<u>MATERIALES</u>
18	30-6	154	2.772.00
36	j5	7.15	257.40
9	j6	9.30	83.70
18	j10	7.45	134.10
6	P	1.57	9.42
54	65	3	162.00
6	VE1-2	41	246.00
6	F1-2	26	156.00
6	VM2-12	42	252.00
12	ex	14	168.00
<hr/>			
SUB-TOTAL			4 240.62

3 M 1/0 ACSR	1685	5 055.00
Mano de Obra	<u>6278</u>	<u>6 278.00</u>
TOTAL		15 574.00

3 M 2 ACSR	1117	3 351.00
Mano de Obra	<u>5800*</u>	<u>5 800.00</u>
TOTAL		13 392.00

3 M 4 ACSR	746	2 238.00
Mano de Obra	<u>5149</u>	<u>5 149.00</u>
TOTAL		11 628.00

* Costo Estimado

COSTO BASE POR MILLA SECUNDARIA 300' CLARO - 2 HILOS

"UNDERBUILD"

<u>CANTIDAD</u>	<u>DESCRIPCION</u>	<u>\$/UNIDAD</u>	<u>MATERIALES</u>
18	j10	7.45	134.10
36	j5	7.15	257.40
9	j6	0.30	83.70
6	P	1.57	9.42
54	bv	3	162.00
3	VE1-2	41	123.00*
3	F1-2	26	78.00
2	VM2-12	42	84
12	ex	14.60	175.20
	SUB-TOTAL		1.106.82 1.107.00

2 M 1/0 ACSR 1685 - 3 370
 Mano de Obra 3046 - 3 046
 TOTAL 7 523.00

2 M 2 ACSR 1117 - 2 234
 Mano de Obra 2600 - 2 600
 TOTAL 5 941.00

2 M 4 ACSR 746 - 1 492
 Mano de Obra 2293 - 2 293
 TOTAL 4 892.00

COSTO BASE POR MILLA SECUNDARIO 150' CLARO 3 HILOS

<u>CANTIDAD</u>	<u>DESCRIPCION</u>	<u>\$/UNIDAD</u>	<u>MATERIALES</u>
36	30-6	154	5544
72	j5	7.15	514.8
18	j6	9.30	167.4
36	j10	7.45	268.2
12	P	1.57	18.84
108	bv	3	324
6	VE1-2	41	246
6	F1-2	26	156
6	VM2-12	42	252
12	ex	14	168
			7 659.24

3 M. 1/0 ACSR 1685	5 055.00
Mano de Obra	<u>9 092.00</u>
TOTAL	<u><u>21 806.00</u></u>

3 M. 2 ACSR 1117	3 351.00
Mano de Obra	<u>8 000.00</u>
TOTAL	<u><u>19 010.00</u></u>

3 M. 4 ACSR 746	2 238.00
Mano de Obra	<u>7 000.00</u>
TOTAL	<u><u>16 897.00</u></u>

COSTO BASE POR MILLA - ALUMBRADO PUBLICO

<u>CANTIDAD</u>	<u>DESCRIPCION</u>	<u>\$/UNIDAD</u>	<u>TOTAL</u>
18	Lumin.175W	262	4 716
23	j5	7.15	164.45
8	j6	9.30	74.40
6	j10	7.45	44.70
1M	4ACSR	746	746
42	Conectores	1.57	<u>65.94</u>
			5 811.49

Materiales - 5 812
 Mano de Obra 2 130
7 942

NOTA: Se suponen luminarias instaladas a 300' con el conductor piloto apoyado cada 150'.

COSTO BASE DE MEDIDORES Y SERVICIOS

1Ø - 120 V	<u>MEDIDORES</u>
15 A	112
1Ø - 120 V	
30 A	120
3Ø - 240 V	
2.5A - D.M.	610

	S.W.	T.C.	CABLE ACOMET	CABLE CONCENT	TOTALES
1Ø - 120 V			Duplex #6		
15 A	31	----	34	2	66.00
1Ø - 120/240V			Triplex #6		
30 A	45	----	50	5	100.00
	3Ø-240V-4h				
	<u>30-400A</u>	<u>400y600/5A</u>	<u>Cuad. 3/OA</u>		
3Ø - 240 V					
2.5A - D.M.	712	155	328	-	1 195.00

COSTO BASE DE MEDIDORES Y SERVICIOS

SERVICIOS:	<u>MAT.</u>	<u>M.de O.</u>	<u>TOTAL \$</u>
1 Ø - Residencial 2 hilos	66.00	20.00	86.00
1 Ø - Residencial 3 hilos	100.00	20.00	120.00
3 Ø - Industrial 4 hilos	1 195.00	50.00	1 245.00
MEDIDORES:			
1 Ø - 120V-15A - 2 hilos	112.00	10.00	122.00
1 Ø - 120/240-30A 3 hilos	120.00	10.00	130.00
3 Ø - 120/240V-2.5A 4 hilos	610.00	100.00	710.00

COOPERATIVE BASE

UNIT COST

<u>SERVICES</u>	<u>MATER</u>	<u>M.de O.</u>	<u>TOTAL</u>
1 Ø 2 hilos Residential	66	20	86
1 Ø 3 hilos Residential	100	20	120
3 Ø 4 hilos Industrial	1195	50	1245
 <u>METERS</u>			
1 Ø 2 hilos 15 A 120 V.	112	10	122
1 Ø 3 hilos 30A 120/240V.	120	10	130
3 Ø 4 hilos 2.5A 120/240V	610	100	710
 <u>RECLOSERS</u>			
3 Ø 100 Amps. Tipo	14 449	319	14 768
3 Ø 50 Amps. Tipo Hr-3	9 465	319	9 784
3 Ø 25 Amps. Tipo Hr-3	9 465	319	9 784
1 Ø 50 Amps.	2 400	142	2 542
1 Ø 25 Amps.	2 400	142	2 542
Inside house wiring	70	30	100
Street light	5 812	2 130	7 942

COOPERATIVE " E "

UNIT COST OF LINES AND EQUIPMENT

<u>SERVICES</u>	<u>110% MATERIALS</u>	<u>110% LABOR</u>	<u>TOTAL</u>
1Ø 2 wires Residential	73	22	95
1Ø 3 wires Residential	110	22	132
3Ø 4 wires Industrial	1315	55	1370
 <u>METERS</u>			
1Ø 2 wires 15A-120V	123	11	134
1Ø 3 wires 30A 120/240V.	132	11	143
3Ø 4 wires 2.5A 120/240V.	671	110	781
 <u>RECLOSERS</u>			
3Ø 100 Amps.	15849	351	16200
3Ø 50 Amps.	10412	351	10763
3Ø 25 Amps.	10412	351	1076
1Ø 50 Amps.	2640	156	2796
1Ø 25 Amps.	2640	156	2796
Inside house wiring	77	33	110
Street lighting 240V. #4	6393	2343	8736

<u>INSTALACIONES INTERNAS</u>	<u>CANTIDAD</u>	<u>\$/UNIDAD</u>	
Sockets de cadena	2	5.20	10.40
Tomacorrientes dobles	2	3.10	6.20
Grapas	50	1.4/100P.	0.70
Conductor de cobre 2x10 TW	60'	0.6	36.00
Conductor de cobre 2x14 TW	30'	0.31	9.30
Cinta aislante	$\frac{1}{2}$ R	2.60	1.30
OTROS			<u>6.10</u>
			70.00

<u>INSTALACIONES INTERNAS</u>	<u>MATERIALES</u>	<u>MANO DE OBRA</u>	
	70	30	100

COST BREAKDOWN FOR COOPERATIVES "B", "C", and "D"

Single-Phase distribution lines at \$1600/mile	(65% Material - 25% Labor)
Three-Phase distribution lines at \$2400/mile	(65% Material - 25% Labor)
112.5 KW Transformer banks at \$1000/installation	(90% Material - 10% Labor)
30 KW Transformer banks at \$600/installation	(90% Material - 10% Labor)
\$ 250/consumer which includes primary, secondary and services requirements	(65% Material - 25% Labor)
1. 60 miles of three-phase serving three-phase loads where single-phase was contemplated in the original study.	at \$ 800/mile = \$48,000
2. 95 miles of three-phase serving three-phase loads not contemplated in the original study	at \$ 2400/mile = \$ 228,000
3. 30 miles of three-phase to serve additional irrigation loads within the next 2 to 3 year period	at \$ 2400/mile = \$ 72,000
4. 50 - 112.5 KW Transformer banks serving irrigation loads in Coop. "B" not contemplated in the original study.	at \$ 1000/each = \$ 50,000
5. 20 - 112.5 KW Transformer banks to serve irrigation loads in Coop. "D" not contemplated in the original study.	at \$ 1000/each = \$ 20,000
6. 50 - 112.5 KW Transformer banks to serve additional irrigation loads in Coop. "B" within the next two to three year period.	at \$ 1000/each = \$ 50,000
7. 25 - 30 KW Transformer banks to serve a salt industry in Coop. "C" not contemplated in the original study	at \$ 600/each = \$ 15,000
8. 3500 Residential and Small Commercial Consumers in areas not contemplated in the original study.	at \$ 250/each = \$875,000

MATERIAL REQUIREMENTS

1.	\$ 48,000	x	0.65	= \$ 31,200
2.	228,000	x	0.65	= 148,000
3.	72,000	x	0.65	= 46,800
4.	50,000	x	0.90	= 45,000
5.	20,000	x	0.90	= 18,000
6.	50,000	x	0.90	= 45,000
7.	15,000	x	0.90	= 13,500
8.	\$ 875,000	x	0.65	= <u>568,750</u>
	T O T A L			\$ 916,250

COST BREAKDOWN FOR COOP "A" (CAER No. 1)

\$200/consumer in the rural areas which includes,
secondary and service requirements (65% Material - 25% Labor)

\$100/consumer in the rural-urban housing deve-
lopments which includes primary, secondary and
service requirements (65% Material - 25% Labor)

- | | | | | |
|----|---|---------------|---|-----------|
| 1. | 200 Residential and Small Commercial rural consumers | at \$200/each | = | \$ 40,000 |
| 2. | 1000 Residential and Small Commercial urban consumers | at \$100/each | = | \$100,000 |
| 3. | 2 Pick-ups at \$4000 each | | = | \$ 8,000 |
| 4. | Tools and Work Equipment | | = | \$ 5,000 |

Material and Equipment Requirements

1.	\$40,000	x	0.65	=	\$ 26,000
2.	\$100,000	x	0.65	=	\$ 65,000
3.	Pick-ups			=	\$ 8,000
4.	Tools and Equipment			=	<u>\$ 5,000</u>
	TOTAL				\$104,000

Summary:

Coops. "B", "C" and "D"	\$916,250
Coop. "A"	<u>\$104,000</u>
	\$ 1,020,000

On the assumption that non AID authorized expenditures associated with these purchases, will not exceed 2%, the \$1,000,000 will meet the next three year requirements of Coops, "A", "B", "C" and "D".