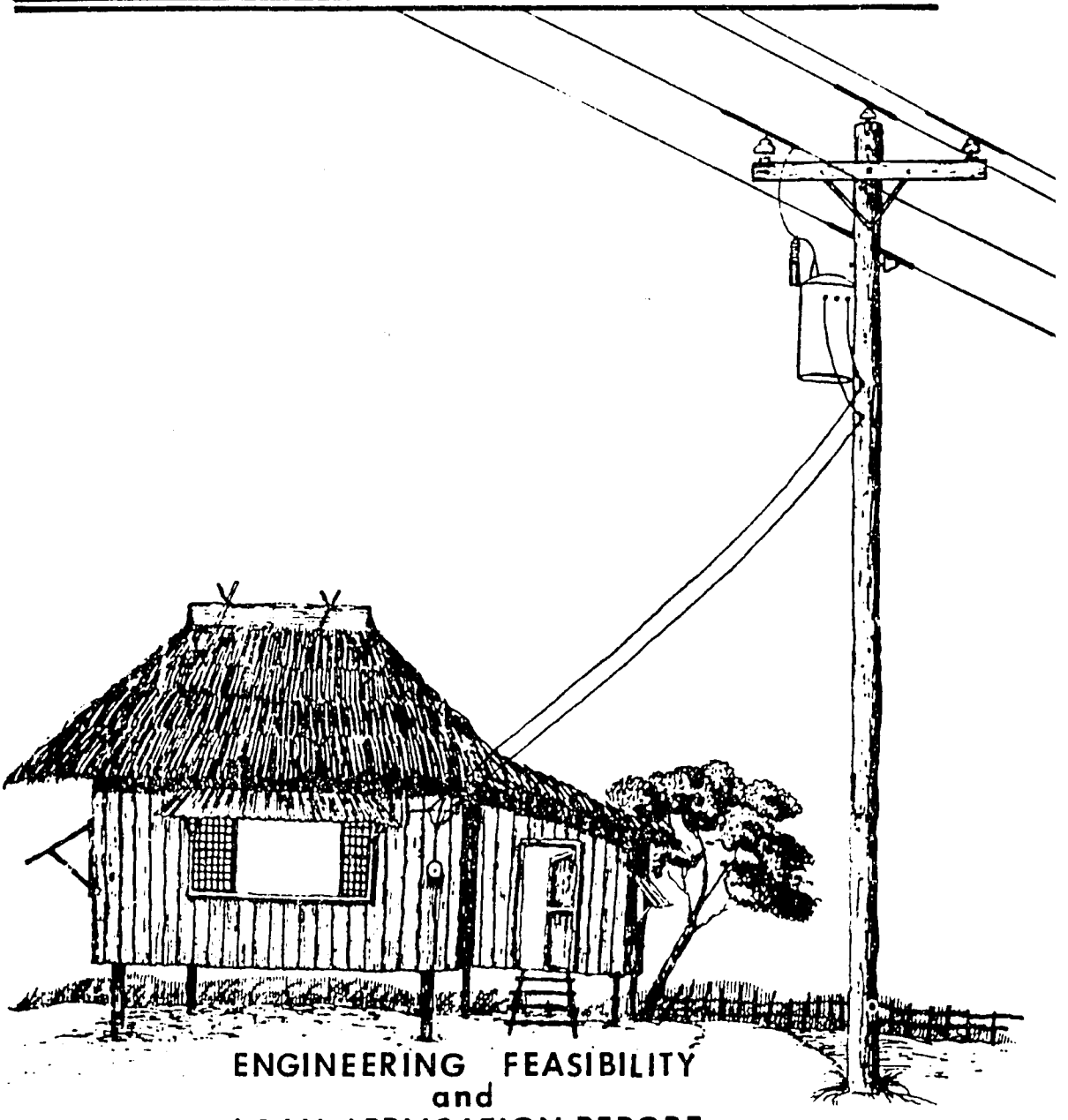
VICTORIAS - MANAPLA - CADIZ

Rural Electric

SERVICE COOPERATIVE

Negros Occidental, Philippines



ENGINEERING FEASIBILITY
and
LOAN APPLICATION REPORT

PN-ABU-457

VICTORIAS-MANAPLA-CADIZ RURAL ELECTRIC SERVICE COOPERATIVE

NEGROS OCCIDENTAL, PHILIPPINES

ENGINEERING - FEASIBILITY and LOAN APPLICATION REPORT

AUGUST, 1967

Prepared By

National Rural Electric Cooperative Association
2000 Florida Avenue, N. W., Washington, D. C.

Rural Electrification Team
Manila, Philippines

Philip Parker
Robert W. Williams, Jr.
Henry W. Horney

PREPARED UNDER

TASK ORDER NO. 58

CONTRACT NO. AID/csd-225

BETWEEN THE

UNITED STATES OF AMERICA

AND THE

NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION

27 February 1967

PIO/T 492-189-3-70015

17 October 1966

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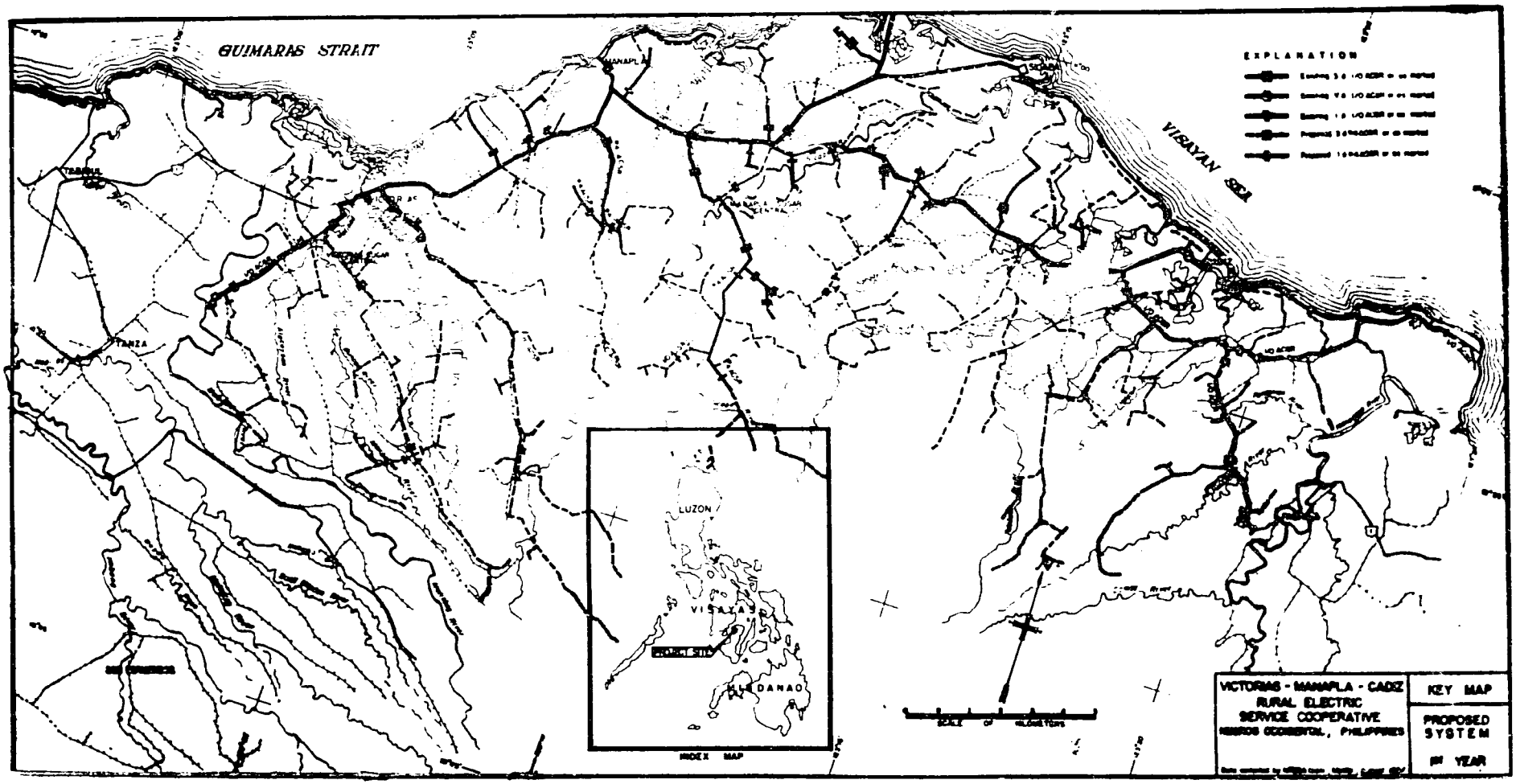
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VICTORIAS-MANAPLA-CADIZ RURAL ELECTRIC SERVICE COOPERATIVE

September, 1967

RESOLUTION

WHEREAS, it is the objective of the Victorias-Manapla-Cadiz Rural Electric Service Cooperative to make dependable, adequate, and reasonably priced electric service available to everyone in the area which it serves, and

WHEREAS, the Cooperative is able to offer only limited service to a few consumers, due to inadequacies in existing facilities and lack of adequate financing for area-coverage concepts of service, and

WHEREAS, a rural electrification team from the National Rural Electric Cooperative Association of the United States, acting through contracts between the United States Agency for International Development and the Philippine National Economic Council, has studied the feasibility of an expanded system;

NOW, THEREFORE, BE IT RESOLVED, that the NRECA team report entitled "Engineering-Feasibility and Loan Application Report", dated August, 1967 be hereby accepted and approved as submitted, and adopted as the Cooperative's plan for expansion and development.

I, ROMEO R. ASCALON, Secretary of Victorias-Manapla-Cadiz Rural Electric Service Cooperative, do hereby certify that the above is a true and correct copy of a resolution contained in the minutes of a meeting of the Board of Directors of VRESCO held on the 6th day of September, 1967, at which meeting a quorum was present.

/s/ Romeo R. Ascalon
Romeo R. Ascalon

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SECTION 1

INTRODUCTION

INTRODUCTION

This report, for Victorias-Manapla-Cadiz Rural Electric Service Cooperative, is prepared and submitted as part of the obligation of the National Rural Electric Cooperative Association's team to the program of rural electrification in the Philippines. The area around Victorias was recommended for development, by the National Power Survey made in 1965, and is selected as the first pilot-project site under our contract.

There are several reasons for selection of this particular area in Negros Occidental. The people there chose to try to satisfy their needs for adequate electric service by forming a rural electric cooperative. Thus an organization already exists and certain groundwork has already been done. The necessary franchises for the three principal Municipalities, which will form most of the proposed service area, have already been secured. A certificate of public necessity and convenience has been issued by the Public Service Commission. Bylaws have been adopted, facilities built, staff hired and service rendered - though in a very limited way. Above all, the people have demonstrated an enthusiasm for their project and are prepared to give freely of their time and energies, and want to develop a system which will help everyone by providing reasonably-priced, dependable, and adequate electric service to all who want and need it. They recognize that such electric service is a major factor in the economic development of the area and the well-being of the people.

Rural electric cooperatives have proven their worth in other locations. They have been largely responsible for the electrification of rural America over the past thirty years. In more recent times the idea has been extended to provide service in other countries throughout the world. The low operating costs of this type of system are essential to help meet feasibility in rural areas which lack the consumer density and economic level of urban districts. A system "owned-by-those-it-serves" has identical interests for the supplier and the consumer, which certainly leads to good standards of service at minimum rates consistent with good service and safety.

Any lack of success of the Cooperative to date is due almost entirely to lack of adequate funds. An electric power system requires a very high level of investment per consumer and gives a relatively low return on that investment. Limited funds restrict the size of a system and small systems are inefficient and impractical. The cost of power from small generating plants plus the

high percentage of revenue necessary to provide for operation, maintenance and administration, results in high cost power to the consumer. The amount of power available is inadequate to support productive endeavors, even if the user could afford it. Only through large systems can there be any measure of efficiency. The larger generating units produce the necessary power to foster commercial and industrial development as well as supply the domestic requirements. Average kwh costs are reduced and the volume of sales is such that the system can afford competent management and professional services. These advantages are passed on to consumers in the form of lower retail costs and dependable service.

The Philippine government is concerned with the lack of rural electrification, and appreciates its need as an important factor in raising the economic level of rural areas, and the standard of living of its residents. There are also advantages in helping the people to help themselves and provide opportunities for a sense of ownership and participation in the democratic processes by which a cooperative is organized and sustained. In 1962 the Electrification Administration was created, responsible to the President, and given the responsibility of fostering and encouraging a program of rural electrification. A small budget was provided to establish a revolving fund - far too small to make much impression on so large a challenge. Policies and procedures of the Agency are not, in our opinion, conducive to the type of rural electrification development which we believe is necessary in order to achieve national objectives.

We must also emphasize that no rural electric system can be launched as a one-time investment proposal. Initial costs, especially for generating plants and transmission lines, must be geared to future needs. Losses must be expected and accepted for the first few years of operation as load and usage is developed. New capital must be made available, for long-term repayment at reasonable rates, to provide for necessary system improvements and expansion. Under the repayment schedules for loan funds it is not possible to produce enough cash margins from operations to provide for all expansion and improvement needs. Thus continuing support for a rural electrification program is just as important as the initial effort.

Rural electrification programs also involve more than consideration which can be given by the Electrification Administration. The activities and policies of other Governmental agencies, such as National Power Corporation, Cooperatives Administration Office, Public Service Commission and Bureau of Public Roads are involved and should be recognized.

We hope that the development of the Victorias-Manapla-Cadiz Rural Electric Service Cooperative will serve as a model for similar development in other areas of the Philippines. Data in this report, refined by actual construction and operating statistics, will be useful to other projects. Success here will be an incentive for others to seek similar relief from electric power deficiencies in their areas. It will also serve as a guide in formulating responsive policies and procedures in Agencies concerned with the rural electrification program.

We believe that this report presents a reasonable, practical and feasible plan to bring the benefits of electric service to a large number of rural people who have never had the opportunity of such service. Loan funds invested in this endeavor should be repaid in full and with interest. It is difficult to express a measure of the benefits to accrue from increased productivity, improved social services, relief from drudgery, and a higher standard of living. The cost of power will be reasonable to the consumer, and it will be available at all times, day or night. If the members are faithful to the ideals and concepts of the co-operative; prudent and businesslike in its operation and manage-ment, it will serve them well and offer ever-increasing benefits as the years go by.

SECTION 2

SUMMARY AND RECOMMENDATIONS

SUMMARY AND RECOMMENDATIONS

SECTION 2

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SECTION 3

ANALYSIS OF EXISTING SYSTEM

ANALYSIS OF EXISTING SYSTEM

SECTION 3

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11. With assistance from the Consulting Engineers and NRECA staff, the Cooperative should negotiate a contract with Victorias Milling Company for the installation and operation of diesel-electric units.

12. There must be continued cooperation with other agencies of government, in addition to the Electrification Administration, such as the Public Service Commission, Cooperatives Administration Office, Bureau of Public Roads, National Power Corporation and others which may be concerned with a rural electrification program. Such cooperation should lead to rules and regulations, standards of construction, and safety measures which are responsive to the problems and needs of development of rural systems.

13. When a loan is announced the Cooperative, using working funds provided, should proceed with staff organization and training, and the development of administrative and operating policies and methods. The NRECA rural electrification team will be available for consultation and active cooperation in this work.

14. Every effort should be made to secure release of the balance of the loan funds already committed by the EA to the project. This will permit payment of obligations incurred during construction of existing facilities, in reliance on the total loan.

15. The Electrification Administration is the agency charged with responsibility to foster and develop a rural electrification program. They should be fully informed of all phases of system development so that lessons which may be learned from this pilot project can be adapted for use in other areas.

16. There must be realization that rural electrification is a national concern. The economic and social development of the rural areas are a matter of national interest. The values to be derived from this Cooperative system may be lost if it is not sustained under a long-range financial program, and permitted to operate within a reasonable framework of regulation and utility law.

and techniques acceptable for application in a general nationwide program of rural electrification.

The Electrification Administration will be invited and encouraged to observe all phases of engineering, construction, operation and management of the project so that mutual benefits may be derived for the electrification program.

B. Recommendations:

1. This report provides for expansion of the Victorias-Manapla-Cadiz Rural Electric Service Cooperative in Negros Occidental, so that service will be available to all who need it. This service will be available at reasonable rates; on a 24-hour basis, and in adequate amounts.

2. Development of this pilot project will satisfy objectives of the Administration to encourage and foster a program of rural electrification responsive to the economic and social needs of the Country.

3. The NRECA rural electrification team finds that development of this Cooperative is practical and feasible and that loan funds may prudently be committed to the project. These loan funds will be repaid in full with interest. Long-term loans at low interest will be necessary to develop feasibility and provide service at rate schedules which the rural people can afford, and which will encourage the abundant use of electric power for home and industry.

4. Favorable consideration should be given to the VRESCO loan application which may be summarized as follows:

Distribution facilities	₱3,985,010
Generation equipment	3,150,000
Contingencies, transportation, communication, tools and equipment	901,990
Sub-total	₱8,037,000

These funds should be made available at 3-1/2% interest, and repaid over 25 years but including a 5-year deferment for principal payments.

For a house wiring program and to provide working funds:

Wiring program	₱363,000
Working funds	137,000
Sub-total	₱500,000

These funds should be made available at interest not to exceed 3-1/2% and should be repaid in one lump sum 5 years after the date of the note.

Loans should be made with U.S. dollar and peso components appropriate to the resources and policies of the agencies concerned with the program, and in line with the use to be made of the funds.

5. The loan should be made directly with VRESCO. Funds should be released only on requisition by the Cooperative, for stated purposes recommended by the independent supervising consulting engineers, and approved by NRECA staff.

6. System engineering work from design through construction and acceptance should be through contract services with competent Consulting Engineers. We recommend that this work be done by an association of a Filipino Company and a U.S. Company experienced with the rural electrification program through Cooperatives.

7. There must be firm control over material orders to ensure that reasonable standards of quality are met. Consideration should be given to separate material orders for major equipment items, based on specifications and inspection provided by the Consulting Engineers. Construction should then be considered by labor only contract. In every case the contracts should be awarded after competitive bidding from qualified suppliers and contractors.

8. The Cooperative, as a prerequisite to fund releases, must obtain necessary commitments from members for electric service; contracts for commercial, irrigation and large-power connections where appropriate, and also sufficient contracts for wiring workers' houses so that feasibility conditions can be met.

9. The Cooperative must take steps to secure franchises for the parts of two Municipalities which lie within the proposed service area, but are not included in the existing franchise.

10. In order that the maximum benefits of the service shall flow to the most people, the Cooperative should reestablish its service commitments in the town of Manapla and serve each individual consumer there, as a direct customer.

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SUMMARY AND RECOMMENDATIONS

A. Summary:

This report presents a plan for extended service by the Victorias-Manapla-Cadiz Rural Electric Service Cooperative in Negros Occidental. The Cooperative is newly formed and is struggling with problems of financing, power supply, organization and operation. Their Board of Directors has accepted a proposal for this study to be made by the rural electrification team of the National Rural Electric Cooperative Association. This is done under NEC/AID agreements which seek to develop a rural electrification program, following original recommendations made in 1965 by the National Power Survey.

The analysis covers a ten-year period with system needs scheduled year by year. Thus the system ability and capacity will match the growth of demand and consumption. Financial forecasts are also made year by year over the same period. The loan application covers the funding of the initial construction program plus two years development. It is anticipated that future loans will be made on a two-year basis.

A distribution system has been designed based on data secured from field surveys. These 7.6/13.2 kv. lines will distribute adequate amounts of power, in a safe, dependable and useful manner to all who want service in the Cooperative's area. Service should be available to everyone - farm worker, planter, landowner, business, commercial, farms, schools, churches and hospitals. Service should also be provided at reasonable rates, and new rate schedules are proposed for this purpose. They are adequate to ensure feasibility but offer substantial reductions over current schedules. The initial construction will provide about 375 km. of new primary distribution line to add to the existing 75 km. and to serve about 6700 meters. Construction standards are proposed, based on standards used in the rural electrification program of the U.S., which will provide safe and adequate service at minimum cost.

A limited, non-firm power supply is one of the problems which faces the Cooperative. Plans are developed to install two diesel-electric units each rated 1750 kw. These will be followed by two more similar units as load grows. It is anticipated that the third unit will be added during the third year of operation and the fourth unit during the sixth year. Proposals are made for an agreement with Victorias Milling Company for installation of the generators

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at the Manapla compound and operation by experienced VMC staff. Mutual benefits to be derived from such an arrangement are discussed briefly.

One fundamental concept in the development of the non-profit cooperative venture is that electric service shall be available to everyone. An important group to be served are the nipa huts and small homes of the farm workers. A wiring program is proposed which will enable these dwellings to be equipped for lights and small appliance connections without delay. This wiring program is vital for the success of the Cooperative. Not only will it be the means of ensuring that the workers' houses are served, but it will also provide, through the large number of connections, the revenue necessary to provide for operation and maintenance of the system.

Cost estimates have been made for all units of construction. This data has been compiled from current prices obtained from suppliers, the Electrification Administration records, and from records of other operating utilities. Estimates of revenue have also been made based on proposed new rate schedules, consumption and customer estimates. Feasibility is shown with a break-even point at about the fourth year, and margins available in the fifth. Detailed forecasts of revenue and expenses have been made over the ten-year period.

All of the data developed in the report leads to the conclusion that an investment in this project would be both prudent and feasible. The report concludes with a loan application to USAID and NEC for a total of ₱8, 537, 000 divided by purpose as follows:

Distribution facilities	₱3, 985, 010
Generation equipment	3, 150, 000
Contingencies, transportation, communications, tools, etc.	901, 990
Wiring program	363, 000
Working funds	137, 000
	₱8, 537, 000

The plant funds to be borrowed at 3-1/2% for 25 years, with principal payments deferred for 5 years. The wiring program and working funds to be repaid in full, after 5 years, and at interest not to exceed 3-1/2%.

One principal objective in developing this Cooperative is that it may serve as a model for similar projects in other areas. Success here will be of great value in making the ideas, concepts

ANALYSIS OF EXISTING SYSTEM

A. Description:

The Victorias-Manapla-Cadiz Rural Electric Service Cooperative was organized by the sugar planters of the Victorias Milling Company's marketing area. Two other cooperative organizations were serving this group's needs in marketing the crops and securing domestic and agricultural supplies. These cooperatives have been working in a satisfactory and beneficial way for their members. It was logical for the planters to turn to the same type of self-help attitude in order to satisfy their needs for electricity for domestic and agricultural purposes.

Electric service franchises existed in the Municipalities of the area. Service, however, was limited to the main Poblacions and even there was erratic and undependable, high-priced, and of poor quality. There was no service at all rendered to the outlying barrios and rural sections. Many haciendas operated small individual generating sets for the main house and such other services as could be given conveniently, but this has always been an expensive and inadequate means of furnishing electric power.

The ideas of a cooperative endeavour were given impetus through Don Carlos Locsin, Chairman of the Board of Victorias Milling Company. Having studied the Rural Electrification program in the U.S., he urged the adoption of similar concepts and ideals for the development of electric power in rural areas of the Philippines. He was joined by other dedicated citizens and the cooperative was formed, not only to serve the needs of the planters' homes, but to serve the needs of the whole area - workers' houses, schools, churches, hospital, cottage industries, commercial establishments, irrigation pumps - in fact, service to all who need it.

A Congressional franchise was secured, Republic Act No. 4588, covering the Municipality of Victorias outside the Poblacion boundary as of June 19, 1965; the Municipality of Manapla and the Municipality of Cadiz outside the Poblacion boundary as of June 19, 1965. The Public Service Commission granted a certificate of public convenience and necessity covering service in the franchised area.

By-laws were adopted which conform closely with model by-laws recommended or required by the Cooperatives Administration

Office. These by-laws have been satisfactory for getting the Cooperative started, but are generally oriented towards the needs of cooperatives which deal in goods rather than services. Rate schedules were also adopted based on the "standard" schedules recommended by PSC for rural systems.

In all of these endeavours the cooperative was aided and encouraged by VMC who recognized that their own interests were present too in the interests of the planters. As a matter of civic conscience, as well as good public relations, the Company helped with this program designed to bring a higher standard of living, a better way of life, more productivity and more opportunity to the rural area and its people.

B. Board of Directors:

The affairs of the Cooperative are managed by a seven-man Board of Directors who represent the members' interests. They serve without pay and are subject to election by the membership. Meetings are held once each month on a regular basis. The present members of the Board are:

Cornelio M. Consing	- President (Planter)
Daniel G. Gustillo	- 1st Vice President (Planter)
Vicente Montinola	- 2nd Vice President (Planter)
Claudio R. de Luzuriaga	- Director (Vice Pres. VMC)
Salud Montinola	- Director (Planter)
Jose M. Consing	- Director (Manager Rural Bank)
Jesus M. Fermin	- Director (Mayor of Victorias)

Two other members also serve in the capacities of Treasurer and Secretary.

Eduardo Locsin	- Treasurer
Romeo R. Ascalon	- Secretary

C. Staff:

The Cooperative maintains a small staff. Mr. Remo B. Ramos, Manager of the marketing and supply cooperatives, manages VRESCO on a part-time basis. Other office services such as bookkeeping and secretarial are furnished by the other cooperatives on a cost-reimbursement basis.

Mr. Robert S. Azachee is the Electrical Engineer responsible for the construction and operation of the system. He is assisted by a small group of linemen and helpers - the number varying according to need, but usually less than five.

D. Membership:

The membership now stands at 156 but the Cooperative has only been able to extend service to 53 of these, plus the three Poblacions of Victorias, Manapla and Cadiz. Shortage of capital and lack of adequate power supplies limit expansion at this time.

E. Finances:

Capital for the Cooperative's construction program has come from member's subscriptions to stock, cash deposits and a loan from the Electrification Administration. The EA loan was for ₱424,675 and construction was planned and executed on this basis. However, only ₱239,000 has been advanced leaving a balance of ₱185,165 still with EA, which apparently cannot be drawn due to general cash deficiencies for the electrification program. This shortage of loan advances is the principal reason for the accounts payable shown on the balance sheet at the end of this section.

This tentative balance sheet shows a statement of financial condition as of June 30, 1967. Total assets are ₱1,176,351 and little discussion is necessary because most of the entries are self-explanatory.

A statement of operations for the six months period ended June 30, 1967 is also presented at the end of this section. From an operating revenue of ₱83,577 the cost of power purchased from VMC was ₱37,778. This gives a power cost of 45% of revenue - a high but not unreasonable figure. General and administrative charges are given as ₱63,407 or 76% of revenue - a completely unreasonable figure. This is mainly due to depreciation of ₱39,328, which represents a rate of 8%. In our opinion the depreciation rate should be less than half this figure and as such would eliminate the net loss shown for operations.

F. Plant:

The distribution lines of the Cooperative serve 53 members and 3 Poblacions over a primary system built for 7.6/13.2 kv. grounded-Y operation. These lines are as follows:

Description		KM
3ø, #1/0 ACSR, OHN (3/8" steel)		44.6
3ø, #4 ACSR		6.8
	Total 3ø	51.4
Vø, #1/0 ACSR		9.2
Vø, #4 ACSR		5.1
	Total vø	14.3
1ø, #1/0 ACSR		6.6
1ø, #4 ACSR		4.6
	Total 1ø	11.2

These primary distribution lines have associated secondaries and services and 715 kva of transformer capacity for the members, in sizes ranging from 5 kva to 25 kva. The Poblacions are served at wholesale rates to single metering points where the Cooperative maintains transformers and meters. At Victorias there is 500 kva transformer capacity; 75 kva at Manapla, and 500 kva at Cadiz.

Power for the system is supplied by VMC at two points. At Victorias the Cooperative has a substation rated at 2000 kva, 4.16 kv. delta to 7.6/13.2 kv. wye. There is a three-phase transformer with tap-changing under load. This latter feature is not working as there is no 7.6 kv. to 120/240V transformer and the control has to be connected for step-up operation. The second connection is at Manapla where the Cooperative maintains a 750 kva substation, with a three-phase transformer rated 480 volts to 13.2 kv. delta.

There are obvious problems inherent in this system due to the substation differences. The practical problems have been discussed with the Cooperative's staff and long-range solutions will surely be provided by the engineering work of the system expansion.

Construction materials and stores are kept at the Engineer's home, at a warehouse building at Manapla, and in a storage lot adjacent to the substation at Victorias. Most of the value is represented in reels of 3/8" high strength steel. It will be a challenge for the engineers to find some use for it other than as a neutral for a three-phase circuit.

The Cooperative also has a small inventory of tools and equipment, together with three 1941 model trucks.

G. Operation:

The Cooperative's system was built by its own crews, who perform maintenance work on the lines and also construct short extensions as required. There are no oil circuit reclosers though most of the taps are fused to provide some measure of sectionalizing. Construction quality is very good and an effort has been made to construct facilities according to standards established by REA for rural line construction in the U. S. The only criticism we might give is that facilities are "overbuilt" - that adequate service could be rendered with more economical design and construction.

Power is supplied by VMC, and without this source the Cooperative could not have been established and continue to operate. Limitations in this power supply, however, create many problems - acceptable at this time because there is no alternative, but unacceptable in any future design where an adequate and dependable supply must be assured.

For approximately six weeks each year the mill is closed for cleaning, and servicing and inspection of the machinery. During this period the steam-turbines, which are normally the main source of power, are not running. Power is then generated by diesel-units at Victorias and Manapla. The Victorias diesels are used primarily for the plant and compound, and the Cooperative draws what power it can from the diesel-unit at Manapla. This imposes a limit of about 400 kw on the Cooperative's load. Service is then curtailed to the Poblacions and other members if necessary.

During the milling season the Cooperative may draw up to 1000 kw from the Victorias source, except on Mondays when the mill is again closed down for a twelve-hour period for cleaning. At that time the load is again limited by the capacity of the Manapla diesel.

The Cooperative's three-phase line between Victorias and Manapla acts as a tie between the two sites. VMC, during normal operation, wheels its power from Victorias to Manapla to satisfy its own loads at that point. There is no charge for this wheeling service and we presume this is all part of the consideration in the power sale agreement between VMC and VRESCO.

STATEMENT OF OPERATIONS
For the Six Months Period Ended June 30, 1967
(Tentative)

Electric Operating Revenues		₱83,577.49
Less: Electricity Purchased for Resale		37,778.22
Gross Profit		45,799.27
Less: General & Administrative Expenses:		
Salaries & Wages	₱4,652.68	
Traveling & Communication Expenses	2,167.58	
Representation Expenses	50.00	
Fuel & Oil Expenses	895.41	
Repairs & Maintenance, Electric Plant	1,868.13	
SSS Contributions	120.80	
Supplies Expense	2.30	
Interest & Bank Charges	3,463.07	
Educational & Publicity Expenses	4,269.99	
Miscellaneous Expenses	57.06	
Insurance Expense	1,617.99	
Taxes & Licenses	1,271.00	
Rent Expense	806.28	
Injuries & Damages	243.00	
Medical & Hosp. Expenses	781.65	
Legal & Audit Fees	119.50	
Supervision & Engineering Fees	750.00	
Amortization of Organization Expenses & Other Deferred Charges	942.61	
Depreciation Expense	39,327.79	63,406.84
Net Loss Before Other Items		(₱17,607.57)
Less: Interest Income	1,857.06	
Membership Fees	10.00	
Dividend Income	80.00	
	1,947.06	
Less: Correction of Prior Years' Earnings	1,394.82	552.24
Net Loss		(₱17,055.33)

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STATEMENT OF FINANCIAL CONDITION
June 30, 1967
(Tentative)

ASSETS

CURRENT ASSETS		
Cash On Hand	₱ 707.00	
Cash In Banks	66,456.77	
Accounts Receivable, Consumers	48,869.66	
Accounts Receivable, Employees	350.00	
Deposits	21,592.50	
Materials & Supplies Inventory	97,585.65	
Materials & Supplies In Transit	8,360.83	
Total Current Assets		₱243,922.41
INVESTMENTS		
Phil. Federation of Consumers' Cooperatives		1,000.00
FIXED ASSETS		
Electric Plant In Service	988,450.37	
Non-Utility Property	403.92	
	988,854.29	
Less: Accumulated Provision for Depreciation	77,314.11	911,540.18
DEFERRED CHARGES		
Prepaid Insurance	3,198.79	
Organization Expenses	10,367.57	
Other Deferred Charges	6,322.29	19,888.65
Total Assets		₱1,176,351.24

LIABILITIES & MEMBERS' EQUITY

CURRENT LIABILITIES		
Accounts Payable:		
VMC Sugarcane Planters' Coop. Marketing Association, Inc.	235,035.85	
Victorias Milling Co., Inc.	22,598.49	
Consumers' Deposits	1,023.00	
Members' Deposits	376,287.51	
Others	537.52	
Total Current Liabilities		635,482.37
LONG TERM LIABILITIES		
Loans Payable, Electrification Admin.		234,035.21
Total Liabilities		869,517.58

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STATEMENT OF FINANCIAL CONDITION
June 30, 1967 (Tentative)
Continued

MEMBERS' EQUITY		
Capital Stock Authorized: 150,000 Shares at ₱10.00 - ₱1,500,000		
Subscribed: 112,470 shares	₱1,124,700.00	
Less: Subscriptions Receivable	791,550.00	333,150.00
Deficit		(26,316.34)
Total Liabilities & Members' Equity		₱1,176,351.24

SECTION 4

LOAD AND ENERGY FORECASTS

LOAD AND ENERGY FORECASTS

SECTION 4

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LOAD AND ENERGY FORECASTS

A. Description

A count of consumers was made by field survey crews who visited each hacienda and area to be served by the Cooperative. The location of every potential load was marked on a key map and each load classified. These classifications were based on the characteristics of the consumer and the expected consumption. Thus, domestic service was broken down into three subdivisions to properly account for a very wide divergence in kwh consumption rates. These three categories are: (1) The principal homes of landowners and planters which are expected to have high usage in keeping with the substantial character of most of these houses; (2) Overseers' houses which are expected to develop usage in the 300--400 kwh per month range, and (3) Workers' houses which will have very small consumption rates. Other classifications are for categories normally used in the operation of any utility system - commercial, schools and churches, irrigation, large-power and security lighting.

We presume that the Cooperative's proposal to finance nipa hut wiring will receive substantial support from the planters. The success of the Cooperative depends on the workers' houses becoming paying consumers within the shortest practical period. Our estimates call for 80% of the workers' houses to be connected during construction of the initial system. The actual count of such houses was 7950 which could be reasonably served - we have used 6350 of these. The actual counts for other categories have been used for service in the first year, assuming that there will be a general acceptance of the power supply by all concerned.

Consumption rates during the first year of operation have been determined by checking the Cooperative's records for existing service where applicable. Where no such service is presently available we have estimated usage through consultation with the Cooperative's Board and staff backed up with our own experience. We believe that consumption figures are conservative and that the Cooperative may well expect something better.

Estimates of the number of consumers and their average consumption rates have been made annually for a ten-year period. These produce total usage figures which are translated into system demand. All of this data is then applied to other sections of the report in the general determination of revenue and operating costs.

B. Consumer Estimates:

During the ten-year period covered by this report the Cooperative should expect the number of consumers to increase. This will be due to several factors: (1) the general increase in population; (2) a migration into the area by others who seek the benefits which will come from the availability of power, and (3) an expansion of the interests of the people as they utilize new production techniques, cottage industries and commercial ventures made practical by the power supply.

Judgment has been used to apply an appropriate growth factor to each category of consumer. Our estimates, for a ten-year period are as follows:

NUMBER OF CONSUMERS

Classification	Year of Operation				
	1	2	3	4	5
Landowner-Planter	64	74	84	94	104
Overseer	196	216	236	255	275
Worker	6350	6475	6600	6735	6870
Commercial	50	52	54	56	58
Schools & Churches	30	31	32	33	34
Irrigation	10	12	14	16	18
Large Power	3	4	5	6	7
Other Utilities	3	3	3	3	3
Security Light	25	50	75	100	125
	6	7	8	9	10
Landowner-Planter	114	124	134	144	154
Overseer	320	365	410	455	500
Worker	7000	7150	7290	7435	7585
Commercial	61	64	67	70	73
Schools & Churches	35	36	37	38	39
Irrigation	21	25	29	34	40
Large Power	8	9	10	11	12
Other Utilities	3	3	3	3	3
Security Light	150	175	200	225	250

C. Consumption Estimates:

The first year kwh consumption figures for each classification of consumer has been derived from available statistics at the Cooperative, together with judgment based on experience. These average kwh consumption per month values can be expected to increase each year. This is always so in any area where adequate power is available at reasonable cost. The consumers will discover more and more ways to use electricity to increase productivity and ease the burdens of manual labor. As the economic level of the area rises there will be more money available to buy appliances for the home and provide for their use.

We have applied appropriate growth factors to first year consumption rates to derive consumption levels for each year over a ten-year period. The following tabulation shows average kwh consumption per month for each consumer category:

Average KWH/Month Consumption

Classification	Year of Operation				
	1	2	3	4	5
Landowner-Planter	1100	1190	1290	1400	1500
Overseer	350	390	440	490	550
Worker	20	25	30	35	40
Commercial	125	135	145	155	165
Schools & Churches	100	105	110	115	120
Irrigation	2500	2500	2500	2500	2500
Large Power	20000	21000	22000	23000	24000
Other Utilities	37000	41500	46500	52000	58000
Security Light	50	50	50	50	50
	6	7	8	9	10
Landowner-Planter	1630	1760	1900	2050	2210
Overseer	580	610	640	670	700
Worker	45	50	55	60	65
Commercial	175	185	195	205	215
Schools & Churches	125	130	135	140	145
Irrigation	2500	2500	2500	2500	2500
Large Power	25000	25000	25000	25000	25000
Other Utilities	65000	73000	81000	91000	102000
Security Light	50	50	50	50	50

D. Demand and Energy Estimates:

Data given in paragraphs B and C above can be extended to give values for total system kwh sales for each year. Losses must be added in order to derive kwh purchased or generated. We have assumed an initial system loss of 17% with a gradual reduction over a ten-year period to 11%. Experience with other systems has shown these values to be realistic and we feel justified in applying them here. These losses are inherent in the characteristics of the physical plant. Most rural systems in the Philippines use loss figures about 20% higher than these values, with these extra losses marked off to pilferage. We have made no allowance for pilferage, believing that adequate and effective control can eliminate this problem.

The following tabulation shows the annual KWH sold and generated. A more detailed summary showing monthly and annual figures for each consumer classification is given in Section 8.

KWH Sold and Generated

Year	KWH Sold	Losses	KWH Generated
1	5,676,000	17%	6,811,000
2	7,062,000	17%	8,474,000
3	8,526,000	15%	10,061,000
4	10,140,000	15%	11,864,000
5	11,868,000	14%	13,767,000
6	13,896,000	13%	15,980,000
7	15,960,000	12%	18,194,000
8	18,156,000	12%	20,516,000
9	20,508,000	11%	22,969,000
10	23,088,000	11%	25,859,000

To compute system demands we applied annual system load factor estimates to these kwh figures. KW demands derived in this way check closely with demands calculated in the voltage drop study in Section 5. Monthly loads on the system should stay fairly even so the demands shown below have been used as peaks for each year.

Year	KWH	Annual Load Factor	KW Demand
1	6,811,000	38%	2050
2	8,474,000	40%	2400
3	10,061,000	42%	2750
4	11,864,000	44%	3100
5	13,767,000	46%	3450
6	15,980,000	48%	3800
7	18,194,000	50%	4150
8	20,516,000	52%	4500
9	22,969,000	54%	4850
10	25,859,000	56%	5250

SECTION 5

SYSTEM DESIGN

AND

VOLTAGE DROP CALCULATIONS

SYSTEM DESIGN
AND
VOLTAGE DROP CALCULATIONS

SECTION 5

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SYSTEM DESIGN AND VOLTAGE DROP CALCULATIONS:

A. Design Criteria:

The proposed system is one which will offer a high standard of service, not only to loads now in the area but also to future loads as they develop. A standard 7.6/13.2 kv grounded-Y distribution plant is provided in order to conform with the rural electric system standard voltage established by National Power Corporation and Electrification Administration. Service is proposed to all who want and need it and voltage drop calculations have been made to ensure that power will be delivered at acceptable voltage levels. An eight per cent drop from source to load has been used as a maximum.

Up to four circuits are proposed from the generating plant. This will not only ensure reasonable loading on each circuit but permit sectionalizing so that faults may be confined and not affect the entire system. No attempt is made to make a sectionalizing study but loan funds are established to provide oil circuit reclosers at appropriate points on the distribution lines. Adequate sectionalizing is necessary, not only for service reliability but also to facilitate maintenance.

New generation should be provided at the distribution system voltage. This will eliminate the need for additional substation capacity. A simple switching structure for control of the outgoing distribution circuits is all that will be necessary.

B. Existing System:

The existing distribution will be integrated into the new construction easily and with little waste. Facilities have been built in general conformance with REA designs, and although new construction will follow slightly different and more simple specifications, good use can be made of the existing lines without major change.

The main three-phase feeder along the highway is already built using 1/0 ACSR and this can remain as part of the principal circuits from the Manapla plant. An overhead neutral shields much of this line from lightning - a valuable asset though we do not favor the use of high-strength steel as the circuit neutral. We do not recommend changing this neutral, but also do not wish to extend the use of the steel into the new construction program.

Existing substations can be used for ties between the Cooperative's system and VMC facilities. However, limitations due to transformer capacities will govern power transfers between the two systems. Synchronizing devices will also be needed to establish parallel operation between all units at Manapla and Victorias.

C. Scope of System:

The extent of the distribution plant is determined by the location of consumers as established by the field survey. Lines have been drawn on the map to represent distribution lines capable of serving all consumers. Knowing the loads imposed on the system by the quantity and classification of consumers we have calculated the load on each section of line. Voltage drop in each section can then be computed, and a choice made of conductor size and line phasing so that voltage drops fall within acceptable limits.

With the application of the voltage drop criteria and recognizing concepts of load-balance and circuit loading, we have designed a system to extend service on an area-coverage basis.

It has not been found necessary to plan any higher-voltage transmission lines for the period covered by this report. The distribution system is capable of serving all loads which can be foreseen, using generating facilities concentrated at Manapla.

D. Design for Initial System:

A circuit diagram showing the first year system is in paragraph E at the end of this section. Voltage drop calculations have been made with line loading based on the initial system consumer count and consumption rates. Because different classes of consumers are intermingled on the lines, and each class has a different consumption rate, we have calculated an average consumption rate of 41 kwh/month for all consumers. This figure has been used for calculating voltage drops.

With conductor size and line phasing determined by the voltage drop calculations, we can summarize construction needs as follows:

U. S. DEPARTMENT OF AGRICULTURE
RURAL ELECTRIFICATION ADMINISTRATION

VOLTAGE DROP SHEET

SYSTEM DESIGNATION: VRESCO
SUBSTATION: Manapla Generators
SYSTEM DESIGN: 7.6/13.2 KV. Grd. - Y
SYSTEM ENGINEER: NRECA
CIRCUITS: NORTH-WEST
DATE: AUGUST 1967

SECTION		LOAD									LINE						VOLTAGE DROP		
		CONSUMERS					CONCENTRATED												
SOURCE END	LOAD END	WITHIN THIS SECTION	BEYOND THIS SECTION	EQUIV. THIS SECTION	KWH PER MONTH	PEAK KW	WITHIN THIS SECTION	BEYOND THIS SECTION	EQUIV. THIS SECTION	TOTAL KW	CONDUCTOR SIZE CU. EQUIV.	ϕ	KV	VOLTAGE DROP FACTOR	LENGTH OF SECTION IN MI.	MILES*	THIS SECTION	TOTAL	AT POINT
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
3 ABC 2	3 A 5	230	0	115	80	38				38	6	1	7.6		4.4	17.8	1.09	8.53	3 A 5
3 ABC 1.1	3 ABC 2	150	288	361	80	107				107	2	3	13.2		2.4	13.4	.22	7.44	3 ABC 2
3 ABC 1	3 ABC 1.1	0	688	688	80	200				200	2	3	13.2		0.2	11.0	.01	7.22	3 ABC 1.1
2 ABC 1	2 ABC 2	67	63	97	80	33				33	6	3	13.2						
ABC 2	ABC 1	63	818	850	80	246				246	2	3	13.2		1.6	10.8	.34	7.21	ABC 1
ABC 3	ABC 2	0	881	881	80	254		396	396	650	2	3	13.2		0.4	9.2	.23	6.87	ABC 2
ABC 7	ABC 3	233	960	1076	80	309			396	705	2	3	13.2		2.4	8.8	1.45	6.64	ABC 3
ABC 9	ABC 7	15	1345	1353	80	375			396	771	2	3	13.2		.8	6.4	.53	5.19	ABC 7
ABC 12	ABC 9	50	1567	1592	80	452			396	848	2	3	13.2		1.3	5.6	.95	4.66	ABC 9
ABC 15	ABC 12	1	1741	1742	80	495			396	891	2	3	13.2		1.0	4.3	.77	3.71	ABC 12
ABC 17	ABC 15	0	1742	1742	80	495		486	486	981	2	3	13.2		.2	3.3	.17	2.94	ABC 15
ABC 18	ABC 17	49	1910	1935	80	550			486	1036	2	3	13.2		1.6	3.1	1.42	2.77	ABC 17
ABC 19	ABC 18	43	1959	1980	80	560			486	1046	2	3	13.2		1.5	1.7	1.35	1.35	ABC 18

* Miles from power source

5th. Year loads on revised system

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U. S. DEPARTMENT OF AGRICULTURE
RURAL ELECTRIFICATION ADMINISTRATION

VOLTAGE DROP SHEET

SYSTEM DESIGNATION: VRESCO
SYSTEM ENGINEER: NRECA
SUBSTATION: Manapla Generators
CIRCUITS: NORTH-EAST #1 & #2
SYSTEM DESIGN: 7.6/13.2 KV. Grd.-Y
DATE: AUGUST 1967

SECTION		LOAD									LINE						VOLTAGE DROP		
		CONSUMERS					CONCENTRATED												
SOURCE END	LOAD END	WITHIN THIS SECTION	BEYOND THIS SECTION	EQUIV. THIS SECTION	KWH PER MONTH	PEAK KW	WITHIN THIS SECTION	BEYOND THIS SECTION	EQUIV. THIS SECTION	TOTAL KW	CONDUCTOR SIZE CU. EQUIV.	ϕ	KV	VOLTAGE DROP FACTOR	LENGTH OF SECTION IN MI.	KW MILES	THIS SECTION	TOTAL	AT POINT
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
NORTH-EAST #2																			
A 49	A 50	436	0	218	80	68				68	2	1	7.6		3.6	19.0	.92	7.51	A 50
A 48	A 49	60	471	501	80	147				147	2	1	7.6		0.9	15.4	.50	6.59	A 49
ABC 47	A 48	11	578	584	80	170				170	2	1	7.6		1.3	14.5	.84	6.09	A 48
ABC 44	ABC 47	22	772	783	80	228				228	2	3	13.2		0.5	13.2	.10	5.25	ABC 47
ABC 45	B 46	138	0	69	80	24				24	6	1	7.6		4.5	19.8	.70	6.06	B 46
ABC 44	ABC 45	159	227	307	80	93				93	2	3	13.2		2.6	15.3	.21	5.36	ABC 45
ABC 43	ABC 44	59	1180	1210	80	345				345	2	3	13.2		0.7	12.7	.21	5.15	ABC 44
ABC 40	ABC 43	23	1236	1248	80	355				355	2	3	13.2		1.0	12.0	.31	4.94	ABC 43
C 41	C 42	134	0	67	80	24				24	6	1	7.6		3.2	17.0	.49	5.24	C 42
ABC 40	C 41	145	134	207	80	64				64	6	1	7.6		2.8	13.8	.12	4.75	C 41
ABC 38	ABC 40	84	1612	1654	80	470				470	2	3	13.2		1.3	11.0	.53	4.63	ABC 40
ABC 19	ABC 38	0	1704	1704	80	485				485	2	3	13.2		9.7	9.7	4.1	4.1	ABC 38
NORTH-EAST #1																			
ABC 38	ABC 39	119	0	60	80	21		170	170	191	2	3	13.2		2.0	11.7	.33	4.17	ABC 39
ABC 36	ABC 38	0	119	119	80	39		170	170	209	2	3	13.2		1.0	9.7	.18	3.84	ABC 38
ABC 33	ABC 36	51	274	300	80	90	42	170	191	281	2	3	13.2		1.3	8.7	.32	3.66	ABC 36
C 34	C 35	158	0	79	80	27				27	6	1	7.6		4.2	12.6	.73	4.66	C 35
ABC 33	C 34	28	284	298	80	90				90	6	1	7.6		1.9	8.4	.59	3.93	C 34
ABC 32	ABC 33	0	639	639	80	185		212	212	397	2	3	13.2		0.5	7.4	.17	3.34	ABC 33
ABC 30	ABC 32	11	671	677	80	196		212	212	408	2	3	13.2		1.9	6.9	.67	3.17	ABC 32
ABC 30	A 30.1	28	0	14	80	6				6	6	1	7.6		2.0	7.0	.10	2.60	A 30.1
ABC 28	ABC 30	152	758	834	80	240		212	212	452	2	3	13.2		3.2	5.0	1.25	2.50	ABC 30
ABC 27	ABC 28	0	14	14	80	6		170	170	176	2	3	13.2		1.4	5.8	.21	2.08	ABC 28
ABC 26	ABC 27	122	291	352	80	105		170	170	275	2	3	13.2		2.6	4.4	.82	1.87	ABC 27
ABC 19	ABC 26	0	1473	1473	80	420		382	382	802	2	3	13.2		1.8	1.8	1.25	1.25	ABC 26

* Miles from power source

5th. Year loads on revised system

REA FORM 239 REV 3-57

U. S. DEPARTMENT OF AGRICULTURE
RURAL ELECTRIFICATION ADMINISTRATION

VOLTAGE DROP SHEET

SYSTEM DESIGNATION: VRESCO
SUBSTATION: MANAPLA GENERATORS
SYSTEM DESIGN: 7.6/13.2 KV. Grd. -Y
SYSTEM ENGINEER: NRECA
CIRCUITS: SOUTH
DATE: AUGUST 1967

SECTION		LOAD									LINE						VOLTAGE DROP		
		CONSUMERS					CONCENTRATED												
SOURCE END	LOAD END	WITHIN THIS SECTION	BEYOND THIS SECTION	EQUIV. THIS SECTION	KWH PER MONTH	PEAK KW	WITHIN THIS SECTION	BEYOND THIS SECTION	EQUIV THIS SECTION	TOTAL KW	CONDUCTOR SIZE CU EQUIV.	ϕ	KV	VOLTAGE DROP FACTOR	LENGTH OF SECTION IN MI.	* MILES	THIS SECTION	TOTAL	AT POINT
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
2 ABC 5	2 C 7	173	0	87	80	30				30	6	1	7.6		3.6	15.5	.70	5.37	2 C 7
2 ABC 3	2 C 4	117	0	69	80	24				24	6	1	7.6		2.2	15.1	.35	5.22	2 C 4
2 ABC 5	2 ABC 3	(SEE BELOW)																	
ABC 4.2	2 ABC 5	90	684	729	80	210				210	2	3	13.2		2.8	11.9	.51	4.67	2 ABC 5
ABC 5	B 6	173	0	87	80	30				30	6	1	7.6		4.4	15.5	.85	5.18	B 6
ABC 4.2	ABC 5	106	292	345	80	96				96	6	3	13.2		2.1	11.1	.17	4.33	ABC 5
ABC 4.1	ABC 4.2	6	1172	1175	80	336				336	6	3	13.2		1.0	9.1	.61	4.16	ABC 4.2
ABC 13.1	ABC 4.1	12	1408	1414	80	400				400	2	3	13.2		2.1	8.1	.72	3.55	ABC 4.1
ABC 24.1	ABC 13.1	42	1539	1560	80	444				444	2	3	13.2		2.4	6.0	.93	2.83	ABC 13.1
ABC 24.2	C 25	59	0	30	80	11.6				11.6	6	1	7.6		2.0	8.0	.22	1.54	C 25
ABC 24.1	ABC 24.2	73	59	96	80	32				32	6	3	13.2		1.5	5.1	.9	1.32	ABC 24.2
ABC 24	ABC 24.1	0	1713	1713	80	486				486	2	3	13.2		.8	3.6	.42	1.90	ABC 24.1
ABC 20	ABC 24	13	1840	1847	80	522				522	2	3	13.2		1.2	2.8	.54	1.48	ABC 24
ABC 22.1	A 31	141	0	72	80	25				25	6	1	7.6		2.6	6.6	.43	1.69	A 31
ABC 21	ABC 22.1	80	200	240	80	74				74	6	3	13.2		1.8	4.0	.24	1.26	ABC 22.1
ABC 20	ABC 21	0	280	280	80	85		70	70	155	2	3	13.2		0.6	2.2	.08	1.02	ABC 21
ABC 19	ABC 20	0	2133	2133	80	605		70	70	675	2	3	13.2		1.8	1.6	.94	.94	ABC 20
2 ABC 2	2 A 2.1	62	0	31	80	11.6				11.6	6	1	7.6		.8	16.3	.06	5.18	2 A 2.1
2 ABC 3	2 ABC 2	165	62	145	80	46.6				46.6	6	3	13.2		2.6	15.5	.25	5.12	2 ABC 2
2 ABC 5	2 ABC 3	44	344	366	80	118				118	6	3	13.2		1.0	12.9	.20	4.87	2 ABC 3

* Miles from power source.

5th. Year loads on revised system.

U. S. DEPARTMENT OF AGRICULTURE
RURAL ELECTRIFICATION ADMINISTRATION

VOLTAGE DROP SHEET

SYSTEM DESIGNATION: VRESCO
SUBSTATION: Manapla Generators
SYSTEM DESIGN: 7.6/13.2 KV. Grd. -Y
SYSTEM ENGINEER: NRECA
CIRCUITS: NORTH-EAST
DATE: AUGUST 1967

SECTION		LOAD									LINE						VOLTAGE DROP		
		CONSUMERS					CONCENTRATED												
SOURCE END	LOAD END	WITHIN THIS SECTION	BEYOND THIS SECTION	EQUIV THIS SECTION	KWH PER MONTH	PEAK KW	WITHIN THIS SECTION	BEYOND THIS SECTION	EQUIV. THIS SECTION	TOTAL KW	CONDUCTOR SIZE CU. EQUIV.	φ	KV	VOLTAGE DROP FACTOR	LENGTH OF SECTION IN MI.	* XXX MILES	THIS SECTION	TOTAL	AT POINT
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A 49	A 50	436	0	218	80	68				68	2	1	7 6		3.6	19.0	.93	11.34	A 50
A 48	A 49	59	471	501	80	147				147	2	1	7.6		0.9	15.4	.50	10.41	A 49
ABC 47	A 48	11	578	584	80	170				170	2	1	7.6		1.3	14.5	.84	9.91	A 48
ABC 44	ABC 47	22	772	783	80	227				227	2	3	13.2		0.5	13.2	.10	9.07	ABC 47
ABC 45	B 46	139	0	70	80	24				24	6	1	7.6		4.5	19.8	.71	9.89	B 46
ABC 44	ABC 45	159	227	307	80	92				92	2	3	13.2		2.6	15.3	.21	9.18	ABC 45
ABC 43	ABC 44	59	1180	1210	80	346				346	2	3	13.2		0.7	12.7	.21	8.97	ABC 44
ABC 40	ABC 43	23	1236	1248	80	355				355	2	3	13.2		1.0	12.0	.31	8.76	ABC 43
C 41	C 42	134	0		80						6	1	7.6		3.2				
ABC 40	C 41	145	134		80						6	1	7.6		2.8				
ABC 38	ABC 40	86	1618	1661	80	470				470	2	3	13.2		1.3	11.0	.53	8.45	ABC 40
"	ABC 39	119	0	60	80	21		170	170	191	2	3	13.2		2.0	11.7	.33		ABC 39
ABC 36	ABC 38	0	1823	1823	80	520		170	170	690	2	3	13.2		1.0	9.7	.60	7.92	ABC 38
ABC 33	ABC 36	51	1978	2004	80	570	42	170	191	761	2	3	13.2		1.3	8.7	.36	7.32	ABC 36
C 34	C 35	158	0		80						6	1	7.6		4.2				
ABC 33	C 34	28	284		80						6	1	7.6		1.0				
ABC 32	ABC 33	0	2343	2343	80	666		212	212	878	6	3	13.2		0.5	7.4	.38	6.46	ABC 33
ABC 30	ABC 32	11	2375	2381	80	679				891	6	3	13.2		1.9	6.9	1.46	6.08	ABC 32
ABC 30	A 30.1	28	0	14	80						6	1	7.6		2.0				
ABC 26	ABC 30	152	2462	2538	80	730			212	942	6	3	13.2		3.2	5.0	2.62	4.62	ABC 30
ABC 27	ABC 28	0	14	14	80	6		170	170		2	3	13.2		1.4	5.8			ABC 28
ABC 26	ABC 27	122	291	352	80				170		2	3	13.2		2.6	4.4			
ABC 19	ABC 26	0	3177	3177	80	900		382	382	1282	2	3	13.2		1.8	1.8	2.0	2.0	ABC 26

* Miles from power source

5th. Year loads on initial system.

U. S. DEPARTMENT OF AGRICULTURE
RURAL ELECTRIFICATION ADMINISTRATION

VOLTAGE DROP SHEET

SYSTEM DESIGNATION	SUBSTATION	SYSTEM DESIGN
VRESCO	MANAPLA GENERATORS	7.6/13.2 KV. Grd. -Y
SYSTEM ENGINEER	**CIRCUITS**	**DATE**
NRECA	NORTH-WEST & SOUTH	AUGUST 1967

SECTION		LOAD									LINE						VOLTAGE DROP		
		CONSUMERS					CONCENTRATED												
SOURCE END	LOAD END	WITHIN THIS SECTION	BEYOND THIS SECTION	EQUIV. THIS SECTION	KWH PER MONTH	PEAK KW	WITHIN THIS SECTION	BEYOND THIS SECTION	EQUIV. THIS SECTION	TOTAL KW	CONDUCTOR SIZE CU. EQUIV.	ϕ	KV	VOLTAGE DROP FACTOR	LENGTH OF SECTION IN MI.	* MILES	THIS SECTION	TOTAL	AT POINT
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
3 ABC 2	3 A 5	230	0	115	80	38				38	6	1	7.6		4.4	17.8	1.09	12.29	3 A 5
3 ABC 1.1	3 ABC 2	150	286	361	80	107				107	2	3	13.2		2.4	13.4	.22	11.20	3 ABC 2
3 ABC 1	3 ABC 1.1	0	688	688	80	200				200	2	3	13.2		0.2	11.0	.07	10.98	3 ABC 1.1
2 ABC 5	2 C 7	173	0	87	80	30				30	6	1	7.6		3.6	19.5	.71	13.28	2 C 7
2 ABC 3	2 ABC 5	44	345	367	80	100				100	6	3	13.2		1.0	15.9	.19	12.57	2 ABC 5
2 ABC 2	2 ABC 3	227	509	623	80	182				182	6	3	13.2		2.6	14.9	.86	12.38	2 ABC 3
2 ABC 1	2 ABC 2	67	736	770	80	223				223	6	3	13.2		1.5	12.3	.61	11.52	2 ABC 2
ABC 2	ABC 1	63	1492	1524	80	433				433	2	3	13.2		1.6	10.8	.61	10.91	ABC 1
ABC 3	ABC 2	0	1555	1555	80	443		396	396	839	2	3	13.2		0.4	9.2	.31	10.30	ABC 2
ABC 5	B6	173	0	87	80	30				30	6	1	7.6		4.4	20.3	.86	12.51	B6
ABC 4	ABC 5	171	292	378	80	112				112	6	3	13.2		4.3	15.9	.86	11.65	ABC 5
ABC 3.1	ABC 4	79	624	664	80	194				194	6	3	13.2		1.7	11.6	.60	10.79	ABC 4
ABC 3	ABC 3.1	0	703	703	80	205				205	2	3	13.2		1.1	9.9	.20	10.19	ABC 3.1
ABC 7	ABC 3	233	2257	2374	80	675			396	1071	2	3	13.2		2.4	8.8	2.22	9.99	ABC 3
ABC 9	ABC 7	15	2670	2678	80	760			396	1156	2	3	13.2		0.8	6.4	.80	7.77	ABC 7
ABC 12	ABC 9	50	2893	2918	80	833			396	1229	2	3	13.2		1.3	5.6	1.58	6.97	ABC 9
ABC 13	B 14	165	0	83	80	29				29	6	1	7.6		4.2	10.9	.80	6.62	B 14
ABC 12	ABC 13	44	306	328	80					98	6	3	13.2		2.4	6.7	.43	5.82	ABC 13
ABC 15	ABC 12	1	3293	3294	80	936			396	1332	2	3	13.2		1.0	4.3	1.15	5.39	ABC 12
ABC 17	ABC 15	0	3294	3294	80	936		486	486	1422	2	3	13.2		0.2	3.3	.25	4.24	ABC 15
ABC 18	ABC 17	49	3462	3487	80	990			486	1476	2	3	13.2		1.6	3.1	2.04	3.99	ABC 17
ABC 19	ABC 18	43	3570	3592	80	1020			486	1506	2	3	13.2		1.5	1.5	1.95	1.95	ABC 18
	SOUTH																		
ABC 24.2	C 25	59	0	30	80	11.5				11.5	6	1	7.6		2.9	8.0	.22	1.54	C 25
ABC 24	ABC 24.2	52	59	85	80	29				29	6	3	13.2		2.3	5.1	.94	1.32	ABC 24.2
ABC 20	ABC 24	13	238	245	80	75				75	2	3	13.2		1.2	2.8	.08	.38	ABC 24
ABC 19	ABC 20	0	494	494	80	144		70	70	214	2	3	13.2		1.6	1.6	.30	.30	ABC 20

* Miles from power source.

5th. Year Loads on Initial System

REA FORM 239 REV 3-57

U. S. DEPARTMENT OF AGRICULTURE
RURAL ELECTRIFICATION ADMINISTRATION

VOLTAGE DROP SHEET

SYSTEM DESIGNATION: VRESCO
SYSTEM ENGINEER: NRECA
SUBSTATION: Manapla Generators
CIRCUITS: NORTH-EAST
SYSTEM DESIGN: 7.6/13.2 KV. Grd. - Y
DATE: AUGUST 1967

SECTION		LOAD									LINE						VOLTAGE DROP		
		CONSUMERS					CONCENTRATED									*			
SOURCE END	LOAD END	WITHIN THIS SECTION	BEYOND THIS SECTION	EQUIV THIS SECTION	KWH PER MONTH	PEAK KW	WITHIN THIS SECTION	BEYOND THIS SECTION	EQUIV. THIS SECTION	TOTAL KW	CONDUCTOR SIZE CU. EQUIV.	ϕ	KV	VOLTAGE DROP FACTOR	LENGTH OF SECTION IN MI.	XXX MILES	THIS SECTION	TOTAL	AT POINT
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A 49	A 50	397	0	199	41	35				35	2	1	7.6		3.6	19 0	.45	6.42	A 50
A 48	A 49	54	430	457	41	76				76	2	1	7.6		0.9	15.4	.26	5.97	A 49
ABC 47	A 48	10	528	533	41	88				88	2	1	7.6		1.3	14.5	.43	5.71	A 48
ABC 44	ABC 47	20	705	715	41	119				119	2	3	13.2		.5	13.2	.06	5.28	ABC 47
ABC 45	B 46	127	0	64	41	12.7				12.7	6	1	7.6		4.5	19.8	.37	5.70	B 46
ABC 44	ABC 45	145	207	280	41	48				48	2	3	13.2		2.6	15.3	.11	5.33	ABC 45
ABC 43	ABC 44	54	1077	1104	41	180				180	2	3	13.2		0.7	12.7	.11	5.22	ABC 44
ABC 40	ABC 43	21	1202	1213	41	196				196	2	3	13.2		1.0	12.0	.17	5.11	ABC 43
C 41	C 42	122	0	61	41	12				12	6	1	7.6		3.2	17.0	.26	5.82	C 42
ABC 40	C 41	132	122	188	41	33				33	6	1	7.6		2.8	13.8	.62	5.56	C 41
ABC 38	ABC 40	78	1478	1517	41	243				243	2	3	13.2		1.3	11.0	.28	4.94	ABC 40
ABC 38	ABC 39	108	0	54	41	11		120	120	131	2	3	13.2		2.0	11.7	.22	4.88	ABC 39
ABC 36	ABC 38	0	1663	1663	41	267	42	120	141	408	2	3	13.2		1.0	9.7	.36	4.66	ABC 38
ABC 33	ABC 36	47	1804	1828	41	292		120	162	454	2	3	13.2		1.3	8.7	.52	4.30	ABC 36
C 34	C 35	144	0	72	41	14				14	6	1	7.6		4.2	12.6	.40	4.49	C 35
ABC 33	C 34	28	260	273	41	47				47	6	1	7.6		1.0	8.4	.31	4.09	C 34
ABC 32	ABC 33	0	2140	2140	41	344		162	162	506	2	3	13.2		0.5	7.4	.22	3.78	ABC 33
ABC 30	ABC 32	11	2165	2170	41	348		162	162	510	2	3	13.2		1.9	8.9	.84	3.56	ABC 32
ABC 30	A 30.1	26	0	13	41	3				3	6	1	7.6		2.0		.01	2.73	A 30.1
ABC 26	ABC 30	139	2245	2315	41	372		162	162	534	2	3	13.2		3.2	5.0	1.47	2.72	ABC 30
ABC 27	ABC 28	0	13	13	41	3		170	170	173	2	3	13.2		1.4	5.8	.20	1.93	ABC 28
ABC 25	ABC 27	112	265	321	41	54		170	170	224	2	3	13.2		2.6	4.4	.48	1.73	ABC 27
ABC 19	ABC 26	0	2901	2901	41	468		332	332	800	2	3	13.2		1.8	1.8	1.25	1.24	ABC 26

* Miles from power source

1st. year loads and system. - Page 5.9

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U. S. DEPARTMENT OF AGRICULTURE
RURAL ELECTRIFICATION ADMINISTRATION

VOLTAGE DROP SHEET

SYSTEM DESIGNATION	SUBSTATION	SYSTEM DESIGN
VRESCO	Manapla Generators	7.6/13.2 KV. Grd. -Y
SYSTEM ENGINEER	**CIRCUITS**	**DATE**
NRECA	NORTH-WEST & SOUTH	AUGUST 1967

SECTION		LOAD									LINE						VOLTAGE DROP		
		CONSUMERS					CONCENTRATED												
SOURCE END	LOAD END	WITHIN THIS SECTION	BEYOND THIS SECTION	EQUIV. THIS SECTION	KWH PER MONTH	PEAK KW	WITHIN THIS SECTION	BEYOND THIS SECTION	EQUIV. THIS SECTION	TOTAL KW	CONDUCTOR SIZE CU. EQUIV.	ϕ	KV	VOLTAGE DROP FACTOR	LENGTH OF SECTION IN MI.	* MILES	THIS SECTION	TOTAL	AT POINT
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
3 A 2	3 A 5	210	0	105	41	20				20	6	1	7.6		4.4	17.8	.55	6.54	3 A 5
3 ABC 1.1	3 ABC 2	121	231	291	41	50				50	2	3	13.2		2.4	13.4	.11	5.99	3 ABC 2
3 ABC 1	3 ABC 1.1	0	628	628	41	103				103	2	3	13.2		0.2	11.0	.01	5.88	3 ABC 1.1
2 ABC 5	2 C 7	158	0	79	41	15				15	6	1	7.6		3.6	19.5	.35	7.08	2 C 7
2 ABC 3	2 ABC 5	40	315	335	41	57				57	6	3	13.2		1.0	15.9	.10	6.73	2 ABC 5
2 ABC 2	2 ABC 3	207	465	569	41	94				94	6	3	13.2		2.6	14.9	.45	6.63	2 ABC 3
2 ABC 1	2 ABC 2	61	672	702	41	115				115	6	3	13.2		1.5	12.3	.31	6.18	2 ABC 2
ABC 2	ABC 1	57	1361	1390	41	222				222	2	3	13.2		1.6	10.8	.30	5.87	ABC 1
ABC 3	ABC 2	0	1420	1420	41	228		240	240	468	2	3	13.2		.4	9.2	.23	5.57	ABC 2
ABC 5	B 6	158	0	79	41	15				15	6	1	7.6		4.4	20.3	.43	6.74	B 6
ABC 4	ABC 5	156	266	344	41	58				58	6	3	13.2		4.3	15.9	.45	6.31	ABC 5
ABC 3.1	ABC 4	72	568	604	41	100				100	6	3	13.2		1.7	11.6	.31	5.86	ABC 4
ABC 3	ABC 3.1	0	640	640	41	105				105	6	3	13.2		1.1	9.9	.21	5.55	ABC 3.1
ABC 7	ABC 3	213	2060	2166	41	346		240	240	586	2	3	13.2		2.4	8.8	1.22	5.34	ABC 3
ABC 9	ABC 7	12	2435	2441	41	390		240	240	630	2	3	13.2		0.8	6.4	.45	4.12	ABC 7
ABC 12	ABC 9	45	2640	2663	41	426		240	240	666	2	3	13.2		1.3	5.6	.76	3.67	ABC 9
ABC 13	B 14	109	0	55	41	11				11	6	1	7.6		4.2	10.9	.30	3.36	B 14
ABC 12	ABC 13	40	182	202	41	36				36	6	3	13.2		2.4	6.7	.15	3.06	ABC 13
ABC 15	ABC 12	1	2910	2910	41	470		240	240	710	2	3	13.2		1.0	4.3	.62	2.91	ABC 12
ABC 15	ABC 16	0	0	0	41	0		65	65	65	2	3	13.2		0.6	3.9	.06	2.35	ABC 16
ABC 17	ABC 15	0	2910	2910	41	470		305	305	775	2	3	13.2		0.2	3.3	.14	2.29	ABC 15
ABC 18	ABC 17	45	3060	3083	41	494		305	305	799	2	3	13.2		1.6	3.1	1.10	2.15	ABC 17
ABC 19	ABC 18	40	3105	3125	41	500		305	305	805	2	3	13.2		1.5	1.5	1.05	1.05	ABC 18
SOUTH																			
ABC 24.3	C 25	53	0	27	41	6				6	6	1	7.6		2.9	8.0	.12	.50	C 25
ABC 24.1	ABC 24.3	62	53	84	41	17				17	6	3	13.2		1.5	5.1	.04	.38	ABC 24.3
ABC 24	ABC 24.1	0	163	336	41	57				57	2	3	13.2		.8	3.6	.01	.34	ABC 24.1
ABC 20	ABC 24	11	370	0	41	62				62	2	3	13.2		1.2	2.8	.08	.33	ABC 24
ABC 20	ABC 21	0	253	253	41	44		70	70	114	2	3	13.2		.6	2.2	.07	.32	ABC 21
ABC 19	ABC 20	0	634	634	41	110		70	70	180	2	3	13.2		1.6	1.6	.25	.25	ABC 20

* Miles from power source

Underbuilt Secondary

Average number consumers per U. B.	4	
Estimated number consumers with U. B.	1200	
Estimated number of U. B. 's	300	
Average length of U. B.	125	meters
Total length of U. B.	38	km.

F. Design for 5th Year System:

A circuit diagram showing the fifth year system layout is in paragraph H at the end of this section. Line loading is based on the projected consumer count and appropriate consumption values. The various consumption rates for different classes of consumers have been reduced to one average rate of 80 kwh per consumer to facilitate calculations. This is reasonable because consumers of different classification are generally intermingled throughout the system.

Two sets of calculations have been made. One shows the effect of fifth year load levels on the initial system layout. This shows voltage drops up to 13% - considerably above our acceptable level of 8%. The second calculations are based on a modified system, and shows acceptable limits. Proposed line conversion and circuit additions necessary to achieve this have been detailed for construction during the third year of operation.

G. Secondary and Service Requirements:

Estimates have been made of the kilometers of line required to serve the consumers through secondary line on its own poles; secondary line underbuilt on primary line poles, and service drops. Experience and judgment have dictated the following quantities:

Distribution transformer capacity ---------- 5000 kva.

Services

Average number consumers per service	1
Total consumers	6731
Average length of service	30 meters
Total length of services	202 km.

Secondary

Average number consumers per secondary	4
Estimated number consumers w/secondary	3364
Estimated number of secondaries	841
Average length of secondary	100 meters
Total length of secondary	84 km.

E. Design for 3rd Year System:

No voltage drop calculations were made for the third year. However, fifth year loads cannot be carried under acceptable limits on the initial system. This is established by the calculations for the fifth year system which show that load levels at that time cannot be carried within acceptable limits. From this we then develop line conversion and new circuit construction necessary to secure satisfactory service conditions.

Depending on load growth characteristics, the need for these system changes will come somewhere between the first and fifth year of operation. We have chosen to show them in the third year for the purpose of this report, and fund them in the initial loan provision.

These system changes are as follows:

Line Section	Description	KM
ABC30 to ABC38	Add 3#1/0ACSR Conductors	3.0
TOTAL		3.0
ABC26 to ABC38	Construct 3ø #1/0ACSR	12.8
ABC13.1 to ABC13.2	" " "	1.9
ABC4.3 to 2ABC5.1	" " "	1.9
TOTAL		16.6
	Use	17.0

3rd Year Design-Conversion

ABC24.1 to ABC13.1	Convert 1ø #1/0 to 3ø #1/0 ACSR	3.9
ABC13.2 to ABC4.1	" " " "	1.4
ABC4.2 to ABC4.3	" " " "	.5
2ABC5.1 to 2ABC5	" " " "	2.1
TOTAL		7.9
	Use	8.0

Line Section	Description		KM
ABC3.1 to ABC5	Construct 3ø #4ACSR		9.80
ABC to 2ABC5	" " "		8.23
ABC24.2 to ABC24.3	" " "		.64
ABC22 to ABC22.1	" " "		2.10
TOTAL			20.77
		Use	21.00
ABC19 to ABC26	Construct 3ø #1/0ACSR Design for future 3ø 1/0ACSR Double Circuit Line		3.00
TOTAL			3.00
ABC to 3ABC2	Construct 3ø #1/0ACSR		4.00
3ABC2 to 3ABC2.1	" " "		.50
ABC38 to ABC47	" " "		5.50
ABC44 to ABC47	" " "		4.20
TOTAL			14.20
		Use	14.00
ABC3 to ABC3.1	Convert Existing Vee Phase Line #1/0ACSR to Three Phase 1/0ACSR		1.60
TOTAL			1.60
		Use	2.00
ABC20 to ABC24.1	Convert Existing One Phase Line #4ACSR to Three Phase #1/0 ACSR		3.22
TOTAL			3.22
		Use	3.00
ABC24.1 to ABC24.2	Convert Existing One Phase Line #4ACSR to Three Phase #4ACSR		1.60
TOTAL			1.60
		Use	2.00

Line Section	Description	KM
*ABC36 to B37	Construct 1ø #4ACSR	5.94
*ABC38 to ABC39	" " "	1.96
*ABC38 to ABC40	" " "	3.70
ABC40 to C42	" " "	20.40
ABC43 to C43.1	" " "	6.90
ABC47 to A50	" " "	18.82
ABC44 to ABC45	" " "	3.05
ABC45 to B46	" " "	13.50
ABC20 to ABC24.2	" " "	11.10
ABC24.2 to C25	" " "	7.05
ABC22.1 to A31	" " "	14.32
ABC18 to A18.1	" " "	2.44
ABC17.1 to B17.2	" " "	4.10
ABC13 to C25	" " "	10.90
*ABC9 to ABC12	" " "	.64
*ABC9 to ABC9.2	" " "	2.57
AT ABC7	" " "	8.86
*ABC3 to ABC7	" " "	1.93
ABC3.1 to ABC5	" " "	13.05
ABC5 to B6	" " "	6.30
ABC to 3ABC2	" " "	11.81
3ABC2 to 3A5	" " "	10.30
ABC to 2ABC5	" " "	16.90
2ABC5 to 2C7	" " "	8.20
ABC19 to ABC26	" " "	2.90
*ABC18 to ABC26	" " "	1.45
*ABC26 to ABC27	" " "	6.75
ABC27 to B29	" " "	10.60
*ABC27 to 28	" " "	2.70
ABC26 to ABC30	" " "	14.15
*ABC30 to ABC33	" " "	3.86
ABC33 to C35	" " "	20.18
*ABC33 to ABC36	" " "	3.06
TOTAL		260.39
	Use	260.00
ABC4.1 to B13.2	Construct 1ø #1/0ACSR	1.60
ABC5 to 2A1	" " "	2.25
ABC42.1 to B13.1	" " "	3.37
TOTAL		7.22
	Use	7.00

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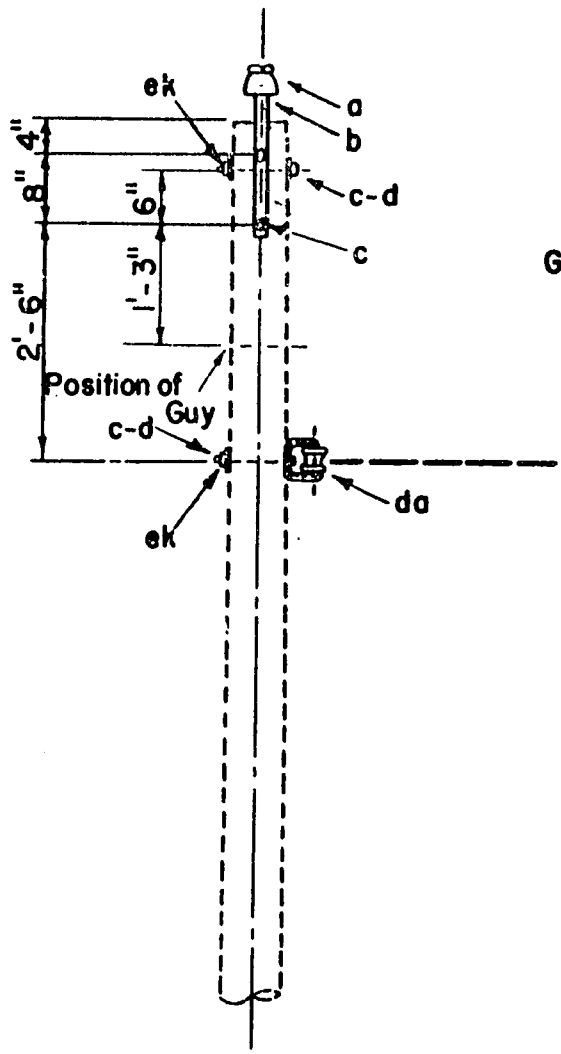
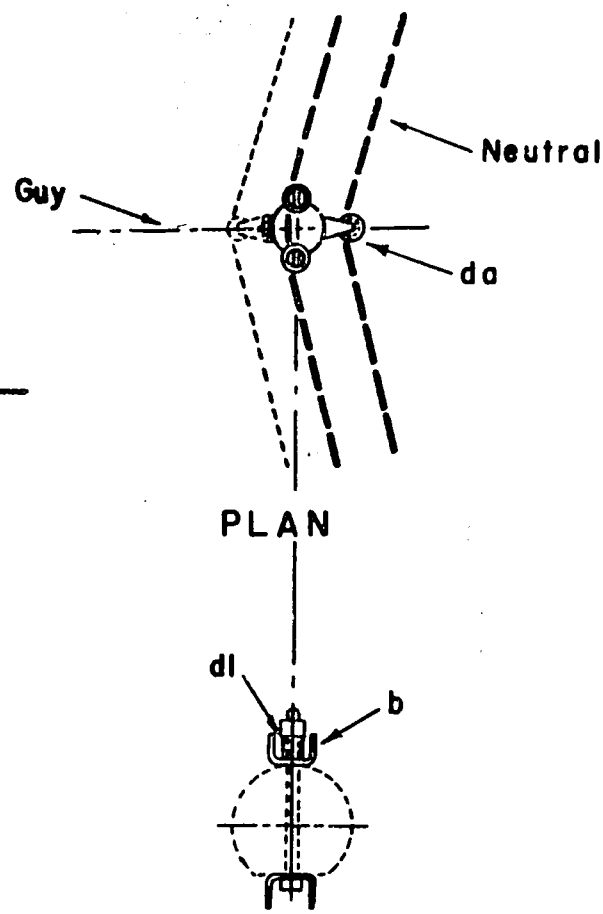
*Work to be done between points - refer to circuit diagram.

SECTION 6

CONSTRUCTION STANDARDS AND COSTS





POLE TOP PIN ASSEMBLY

ITEM	NO. REQ'D	MATERIAL		ITEM	NO. REQ'D	MATERIAL	
a	2	Insulator, pin type		da	1	Bracket, insulated	
b	2	Pin, pole top, 20"		dl	2	Pipe spacer, 3/4" dia. x 1 1/2"	
c	4	Bolt, machine, 5/8" x req'd length		ek		Locknut	
d	3	Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole					

7.2/12.5 KV. 1-PHASE
DOUBLE PRIMARY SUPPORTS
MAX. TRANSVERSE LOADING 500 LBS./PIN
(5° TO 30° MAX. ANGLE)

CONSTRUCTION STANDARD

DISTRIBUTION LINE

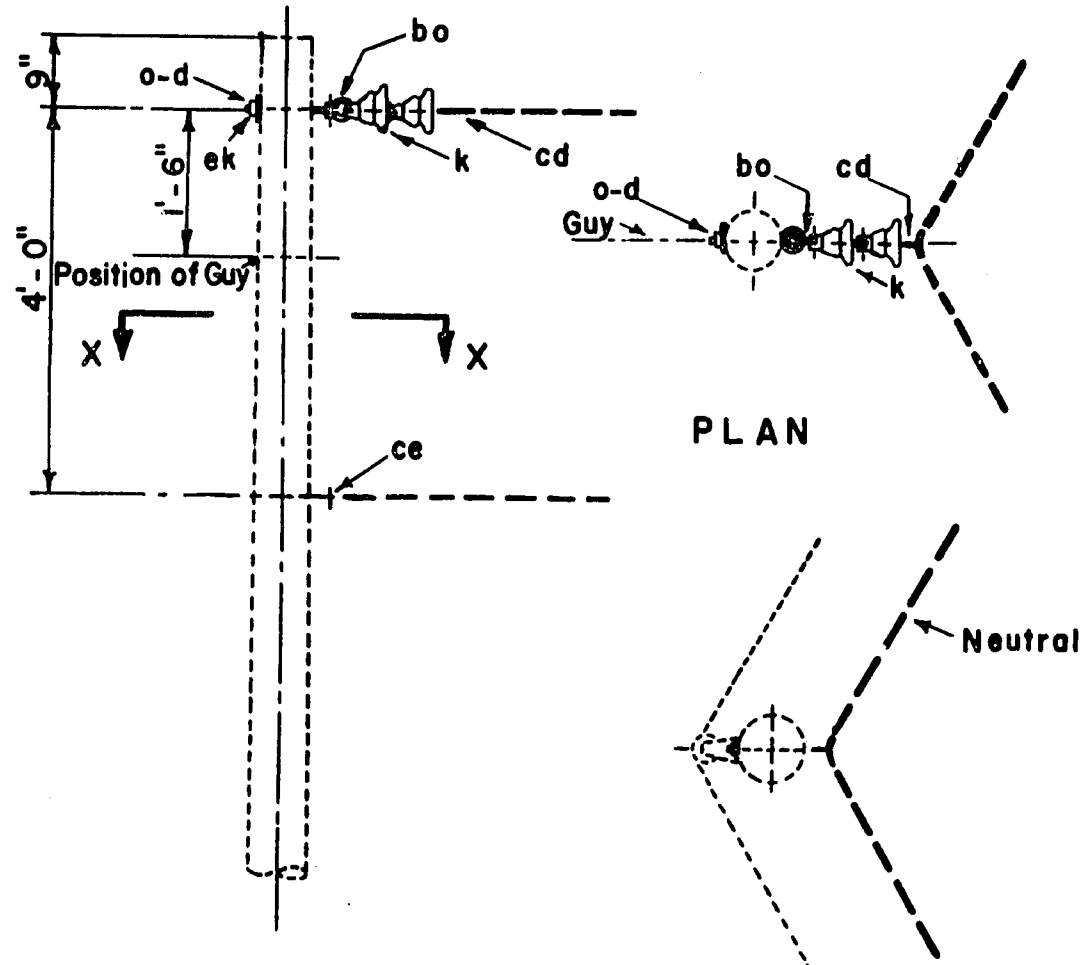
7.6/13.2 KV

A3 1-Phase, 30° to 60° Angle

Item	No.	Material	Unit Cost	Extended Cost
d	1	Washer, 2-1/4" x 2-1/4" x 3/16", 13/16 hole	0.24	0.24
k	2	Insulator, suspension	6.00	12.00
o	1	Bolt eye, 5/8" x req'd length	1.80	1.80
bo	1	Shackle Anchor	5.00	5.00
cd	1	Angle Assembly, primary	7.00	7.00
ce	1	Angle Assembly, Neutral	2.00	2.00
ek	1	Locknut	0.03	0.03

TOTAL ..... ₱28.07

4/6



ITEM	NO. REQ'D	MATERIAL		ITEM	NO. REQ'D	MATERIAL	
				bo	1	Shackle, anchor	
d	1	Washer, 2¼" x 2¼" x 3/16", 13/16" hole		cd	1	Angle assembly, primary	
k	2	Insulator, suspension		ce	1	Angle assembly, neutral	
o	1	Bolt, eye, 5/8" x req'd length		ek		Locknut	

7.2/12.5 KV. PRIMARY 1-PHASE
30° TO 60° ANGLE

CONSTRUCTION STANDARD

DISTRIBUTION LINE

7.6/13.2 KV

A5-2 1-Phase TAP

Item	No.	Material	Unit Cost	Extended Cost
d	2	Washer, 2-1/4" x 2-1/4" x 3/16", 13/16" hole	0.24	0.48
k	2	Insulator, suspension	6.00	12.00
o	3	Bolt, eye 5/8" x req'd length	1.80	5.40
aa	1	Nut, eye, 5/8"	2.40	2.40
ca	1	Deadend assembly, primary	8.50	8.50
cc	1	Deadend assembly, neutral	8.60	8.60
bo	1	Shackle, anchor	5.00	5.00

TOTAL ..... ₱42.38

C. Material Item Costs:

Items	Description	Unit Price
a	Insulator, pin type, 15 kv.	₱ 9.00
b	Pin, pole top, 20"	8.60
c	Bolt, machine, 5/8" x 6"	1.00
c	Bolt, machine, 5/8" x 8"	1.00
c	Bolt, machine, 5/8" x 10"	1.15
c	Bolt, machine, 5/8" x 12"	1.25
c	Bolt, machine, 5/8" x 14"	1.30
c	Bolt, machine, 5/8" x 16"	1.70
d	Washer, square, 2-1/4" x 2-1/4"	0.24
d	Washer, square, 4" x 4"	0.54
f	Pin, cross-arm long shank	3.30
f	Pin, cross-arm short shank	2.70
g	Cross-arm 3-1/2 x 4-1/2 x 8'	14.50
g	Cross-arm 3-1/2 x 4-1/2 x 10'	19.25
h	Brace, cross-arm, flat steel	1.30
h	Brace, cross-arm, steel bow, 60" span	4.24
h	Brace, cross-arm, wood 28"	9.70/pr.
i	Bolt, carriage 3/8" x 4-1/2"	21.65/c
j	Screw, lag 1/2" x 4"	27.40/c
k	Insulator, suspension 6"	6.00
l	Clamp, deadend 4ACSR	6.15
l	Clamp, deadend 2ACSR	6.15
l	Clamp, deadend 1/oACSR	6.15
m	Clamp, suspension #4-1/oACSR	3.92
n	Bolt, double-arming 5/8 x 12"	0.89
n	Bolt, double-arming 5/8 x 14"	0.96
n	Bolt, double-arming 5/8 x 16"	1.38
n	Bolt, double-arming 5/8 x 18"	1.77
o	Bolt, eye oval 5/8 x 10"	1.83
o	Bolt, eye oval 5/8 x 12"	1.80
o	Bolt, eye oval 5/8 x 14"	2.21
p	Connectors AL-Comp 1/o-1/o	2.22
p	Connectors AL-Comp 2-2	87.50/c
p	Connectors AL-Comp 2-4	87.50/c
p	Connectors AL-Comp 4-4	87.50/c
p	Connectors service-Comp #4cu	87.50/c
p	Connectors service-cu	83.20/c
s	Clevis, secondary	1.20
u	Clamp, 3-bolt guy 5/8" heavy	3.20
v	Guy attachment (thimble 3/8" wire)	1.21
w	Insulator, guy strain	76.10/c
x	Rod, anchor, double guy, 5/8 x 6'	5.80
y	Steel strand - 3/8" S. M.	0.13/ft
z	Anchor, expansion 8M lb	8.46
z	Anchor, expansion 10M lb	8.65

Items	Description	Unit Price
aa	Nut, eye 5/8	₱ 2.06
aa	Nut, thimble eye	2.35
ae	Arrester, Lightning Distr. Valve 10kv	46.62
af	Fuse, cut out, 1 shot, open 15kv, 100a	69.80
af	Fuse, " 200A	71.12
ai	Rod, ground 5/8" copperweld	10.00
aj	Clamp, ground rod	2.70
an	Transformer, 7.6kv, 5kva	430.00
an	Transformer, 7.6kv, 7.5kva	565.00
an	Transformer, 7.6kv, 10kva	600.00
an	Transformer, 7.6kv, 15kva	783.00
an	Transformer, 7.6kv, 25kva	970.00
an	Transformer, 7.6kv, 37.5kva	1,350.00
an	Transformer, 7.6kv, 50kva	1,490.00
ap	Clamp, Hot Line AL #4-1/o	7.56
ar	Wireholders	0.08
as	Clevis, service swinging	1.70
av	Conductor, ACSR #4-6/1	0.19/ft
av	Conductor, ACSR #2-6/1	0.16/ft
av	Conductor, ACSR #1/o-6/1	0.20/ft
av	Conductor, ACSR #3/o-6/1	0.31/ft
av	Conductor, cu #6 S.D.	0.24/ft
bh	Clevis, Service Deadend	1.95
bj	Hook, guy	0.84
bk	Band, pole	9.80
bl	Thimble, Deadend 3/8"	1.20
bm	Thimble, guy 5/8"	1.60
bo	Shackle, 3/4" anchor	4.90
bv	Rod, armor, short #4/oACSR	0.59
cm	Insulator, spool 2"	0.57
cm	Insulator, spool 3-1/8"	0.57
cx	Splice, compression #1/oACSR	1.05
cx	Splice, compression #2/oACSR	1.44
cx	Splice, compression #4/oACSR	2.65
ck	Locknut 5/8"	0.03
fj	Bracket, cluster mount	17.10
ga	Meter watthour 15a, 240v	72.00
gb	Socket, meter 100a	8.00
pole	30ft, light wt.	95.00
pole	30ft, stnd wt.	150.00
pole	35ft, light wt.	110.00
pole	35ft, stnd wt.	180.00
pole	40 ft, stnd wt.	230.00
pole	45 ft, stnd wt.	280.00

Items	Description	Unit Price
pole	50ft, stnd wt.	₱ 350.00
av	Conductor #4 Neop. AL. SS	130.00/M.
av	Conductor #6 Neop. AL. SS	65.00/M.
av	Conductor #1/o Triplex AL	694.00/M.
av	Conductor #4/3 Triplex AL	271.00/M.
av	Conductor #6/3 Triplex AL	208.00/M.
	Guys Guards	9.85

D. Standard Unit Costs and Specifications

CONSTRUCTION STANDARD

DISTRIBUTION LINE

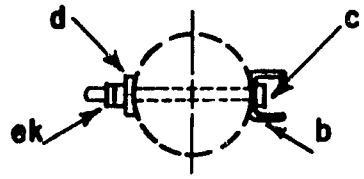
7.6/13.2 KV

A1, A1A - Primary 1-Phase, 0^{o} to 5^{o} Angle
Single Primary Support

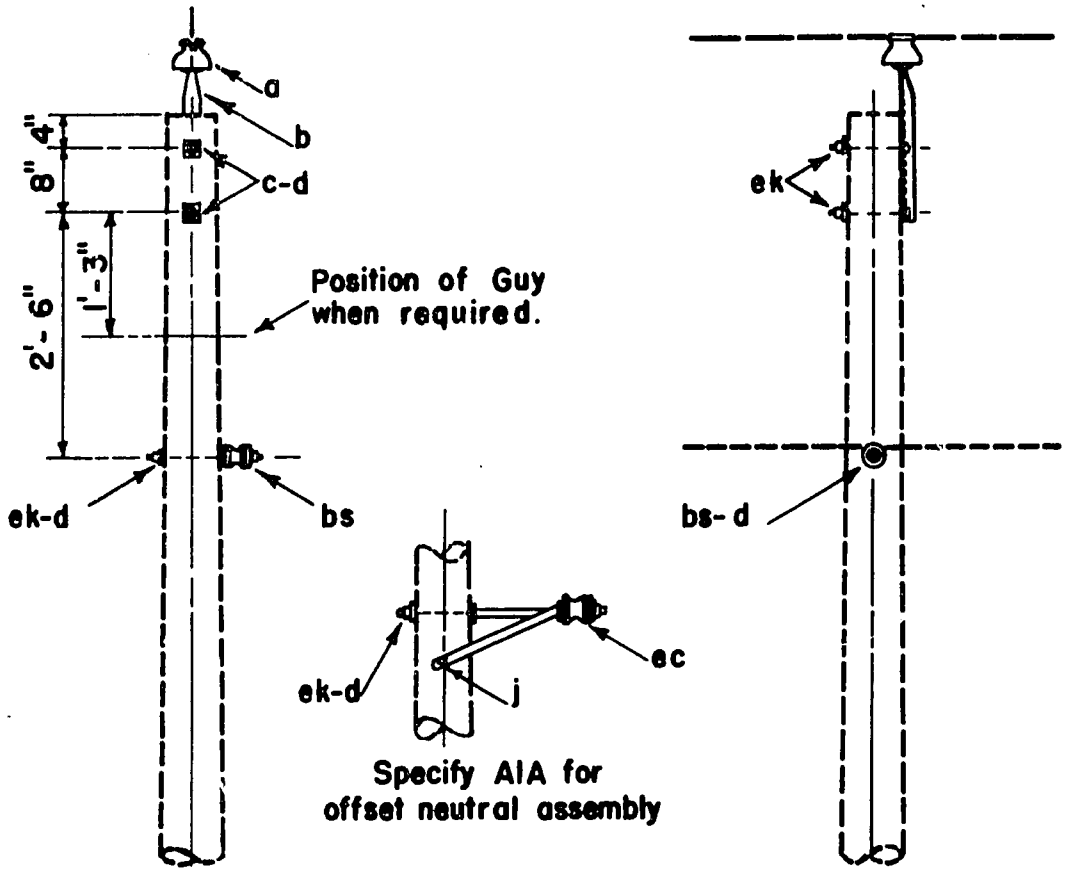
Item	No.	Material	Unit Cost	Extended Cost
a	1	Insulator, pin type	9.00	9.00
b	1	Pin, pole top, 20"	8.60	8.60
c	2	Bolt, machine, 5/8" reg. length	1.15	2.30
j	2	Screw lag 1/2 x 4" (A1A only)	0.14	0.28
ek		Locknuts	0.03	0.06
d	3	Washer, square 2-1/4"	0.24	0.72
bs	1	Bolt, single upset insulated (A1 only)	3.25	3.25
ec	1	Bracket, offset, insulated (A1A only)	8.00	8.00

Total A1 unit cost ..... ₱23.93

Total A1A unit cost ..... ₱28.96



POLE TOP PIN ASSEMBLY



ITEM	NO.	MATERIAL		ITEM	NO.	MATERIAL	
a	1	Insulator, pin type		d	3	Washer, square, 2 1/4"	
b	1	Pin, pole top, 20"		bs	1	Bolt, single upset, insulated, (Al only)	
c	2	Bolt, machine, 5/8"x req'd. length		ec	1	Bracket, offset, insulated, (AlA only)	
j	2	Screw, lag, 1/2"x 4" (AlA only)					
ek		Locknuts					

7.2/12.5 KV. PRIMARY, 1-PHASE,
0° TO 5° ANGLE, SINGLE PRIMARY SUPPORT

CONSTRUCTION STANDARD

DISTRIBUTION LINE

7.6/13.2 KV

A2 1-Phase, 5^{o} to 30^{o} Angle
Double Primary Supports

Item	No.	Material	Unit Cost	Extended Cost
a	2	Insulator, pin type	9.00	18.00
b	2	Pin, Pole top, 20"	8.60	17.20
c	4	Bolt, machine, 5/8" x req'd length	1.15	4.60
d	3	Washer, 2-1/4" x 2-1/4" x 3/16", 13/16" hole	0.24	0.72
da	1	Bracket Insulated	4.60	4.60
dl	2	Pipe spacer, 3/4" dia x 1-1/2"	0.05	0.10
ek	4	Locknut	0.03	0.12

TOTAL ..... ₱45.34

3.92 ₱ = $1.00 -

B. Summary of Unit Costs and Standard Kilometer Costs:

Unit	Cost
Poles:	
Light weight	₱ 110.00
Standard weight	180.00
Pole Top Units:	
A1	23.93
A1A	28.96
A2	45.34
A3	28.07
A3-2	42.38
C1	94.49
C2	172.32
C3	80.30
Conductor/1000M:	
#4 ACSR	685.00
#2 ACSR	722.00
#1/o ACSR	758.00
Guys:	
E1-2	38.51
E2-2	66.07
E3-2	46.61
E4-2	66.58
E10	9.85
F1-2	14.45
F1-3	14.65
Secondary Units:	
J5	4.07
J6	4.54
J8	3.52

55

Unit	Cost
Service Units:	
#4 Al. Triplex/1000M	₱ 838.00
#8 Neoprene/1000M	201.00
K10	0.35
K11	3.57
Miscellaneous:	
M2-1	26.52
M2-2	23.80
Standard Kilometer Costs	
1 Kilometer	
Single-Phase:	
#4 ACSR	₱3,610.00
#2 ACSR	3,650.00
Three-Phase:	
#4 ACSR	6,820.00
#2 ACSR	6,950.00
#1/o ACSR	7,080.00
Secondary Underbuild:	2,000.00
Service:	
#4 Al. Triplex	1,500.00
#8 Neoprene	1,400.00

Rural electric systems are plagued with problems of marginal feasibility, due to light loads, high investment costs per consumer, and high wholesale power costs. The ideal system therefore is one which minimizes construction costs while retaining the necessary virtues of adequacy, reliability, safety, and simplicity of operation and maintenance. We have therefore proposed to take advantage of construction standards developed by the Rural Electrification Administration in the United States. These standards have been refined through experience gained during thirty years of use in electrifying rural America. They represent an economical design which has proven adequate for their service requirement.

In the pages which follow we reproduce prints showing basic units of construction. For complete details of construction under these specifications the reader is referred to REA Form 804, revised August 1962, - "Specifications and Drawings for 7.2/12.5 kv. Line Construction." Copies are available at the Electrification Administration and at AID through the NRECA staff.

A complete review has been made of material costs so that adequate cost estimates could be developed for planned construction. These material prices are included as part of this section, and represent a rationalization of data obtained from EA records, material supply companies, MERALCO purchasing and supply department, and staff experience.

The basic material costs so developed are then applied to the material breakdown shown for each construction unit so that standard costs would be established. Such costs would normally be available from historic records but these do not exist, and in any case we are proposing a new design which will require some materials not in general use. We hope to see these cost estimates refined later in the light of experience, and will expect continuing property records to be established by any system built under the rural electrification program.

Using these unit costs we have then devised standard costs for one kilometer of line in various categories of wire size and phasing. Secondary and service costs have also been derived in this way. The computation sheets are shown for each line category. Basic material costs have then been increased by a factor of 20% to provide for labor costs and overhead.

Two other factors will also affect these costs but have been considered as offsetting each other. These are:

(1) Material prices given are delivered in Manila, and include such taxes as are necessary. A Cooperative, however, is exempt from payment of some taxes and should therefore be able to buy most materials at a price somewhat lower than those given here.

(2) Projects will be built in areas away from Manila and certain allowances should be made for transportation costs.

Transportation costs have been estimated at 5% of the material cost. It is believed that the waiver of some taxes should equal or exceed this amount. By assuming they offset each other we hope to retain adequate funds in the estimates.

CONSTRUCTION STANDARDS AND COSTS

SECTION 6

TABLE OF CONTENTS

CONSTRUCTION STANDARDS AND COSTS

A. Description:

We have recommended that the Electrification Administration should promulgate construction standards which must be met in the expenditure of loan funds. Any release of loan funds should be conditioned upon adequate assurance that the borrowers will use the funds only in this manner. These standards should include the minimum mechanical and electrical qualities for items of material, and also patterns to be followed in the construction of units of distribution system plant.

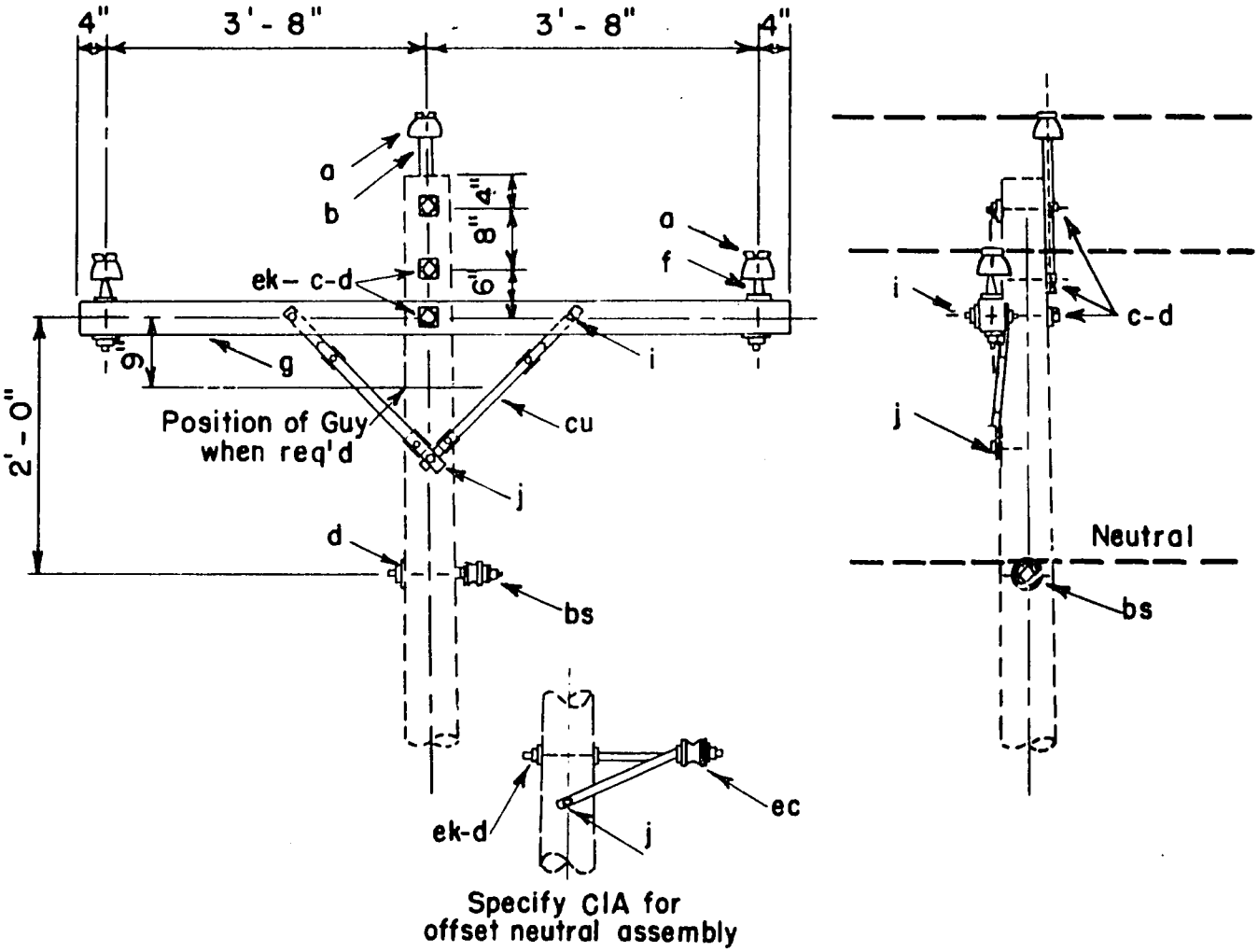
These requirements will help accomplish several objectives:

(1) The purchase of approved material items will give a measure of quality control so that rural electric facilities may be expected to have a reasonable service life, and provide good dependable service with safe operating characteristics.

(2) The security of the loan, which is tied directly to the value and usefulness of the electric facilities, will be improved.

(3) The integration of isolated systems into larger and more efficient plants - a development which will surely come with time - will be facilitated if there are common characteristics.

A decision has already been made by the National Power Corporation and the Electrification Administration that rural electric distribution systems should be constructed for 13.8 kv. operation. We have complied with this decision and have selected a grounded-wye system. We wish to comment, however, that other standards in the "Sub-transmission" range of 34.5 kv. to 69 kv. should be established without delay. The trend towards larger generating plants will soon bring the need for the transmission of blocks of power over larger distances - beyond the economic or practical capacity of 13.8 kv. lines. Consideration will have to be given to 34.5 kv. or 69 kv. transmission systems; however, we are not concerned with such development at this time for this report on the Victorias project development.



Specify CIA for
offset neutral assembly

ITEM	NO.	MATERIAL		ITEM	NO.	MATERIAL	
a	3	Insulator, pin type		cu	2	Brace, wood, 28"	
b	1	Pin, pole top, 20"		i	2	3olt, carriage, 3/8" x 4 1/2"	
c	3	Bolt, machine, 5/8" x req'd length		j	1	Screw, lag, 1/2" x 4" (CI only)	
d	5	Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole		bs	1	Bolt, single upset, insulated(CI only)	
f	2	Pin, crossorm, steel, 5/8" x 10 3/4"		ec	1	Bracket, offset, insulated (CIA only)	
g	1	Crossorm, 3 1/2" x 4 1/2" x 8'-0"		j	3	Screw, lag, 1/2"x4" (CIA only)	
ek		Locknuts					

7.2/12.5 KV., 3-PHASE CROSSARM CONSTRUCTION
SINGLE PRIMARY SUPPORT AT 0° TO 5° ANGLE

CONSTRUCTION STANDARD

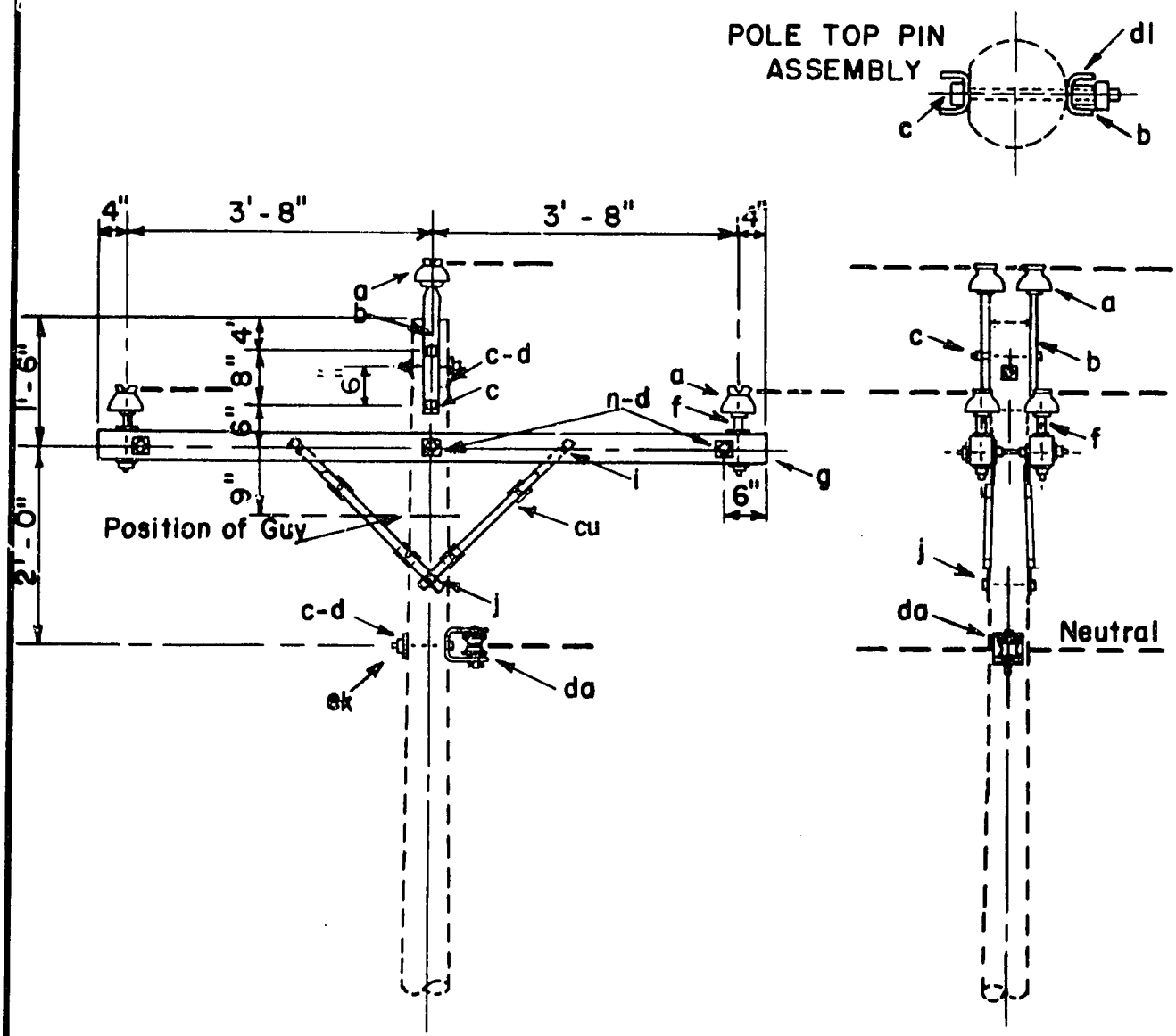
DISTRIBUTION LINE

7.6/13.2 KV

C2 3-Phase Crossarm Construction Double Primary Support

Item	No.	Material	Unit Cost	Extended Cost
a	6	Insulator, pin type	9.00	54.00
b	2	Pin, pole top, 20"	8.60	17.20
c	4	Bolt, machine, 5/8" x req'd length	1.83	7.32
d	13	Washer, 2-1/4" x 2-1/4" x 3/16", 13/16" hole	0.24	3.12
f	4	Pin, crossarm, steel, 5/8" x 10-3/4"	3.30	13.20
g	2	Crossarm, 3-1/2 x 4-1/2" x 8'-0"	14.50	29.00
cu	4	Brace, wood, 28"	9.70	38.80
i	4	Bolt, carriage, 3/8" x 4-1/2"	0.11	0.44
j	2	Screw, lag, 1/2" x 4"	0.14	0.28
da	1	Bracket, insulated	4.60	4.60
dl	2	Pipe, spacer, 3/4" dia. x 1-1/2"	0.05	0.10
ek	4	Locknuts	0.03	0.12
h	3	Bolt, double arming, 5/8" x req'd length	1.38	4.14

TOTAL ..... ₱172.32



NOTE: When the transverse load is more than 500 pounds per pin, substitute C2-1 or C2-2 as required.

ITEM	NO.	MATERIAL		ITEM	NO.	MATERIAL	
a	6	Insulator, pin type		i	4	Bolt, carriage, 3/8" x 4 1/2"	
b	2	Pin, pole top, 20"		j	2	Screw, lag, 1/2" x 4"	
c	4	Bolt, machine, 5/8" x req'd length		n	3	Bolt, double arming, 5/8" x req'd l'gth	
d	13	Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole		da	1	Bracket, insulated	
f	4	Pin, crossarm, steel, 5/8" x 10 3/4"		dl	2	Pipe, spacer, 3/4" dia. x 1 1/2"	
g	2	Crossarm, 3 1/2" x 4 1/2" x 8'-0"		ek		Locknuts	
cu	4	Brace, wood, 28"					

7.2/12.5 KV. - 3 PHASE
CROSSARM CONSTR. DOUBLE PRIMARY SUPPORT
MAX. TRANSVERSE LOADING - 500 LBS./ PIN
5° TO 30° MAX. ANGLE

CONSTRUCTION STANDARD

DISTRIBUTION LINE

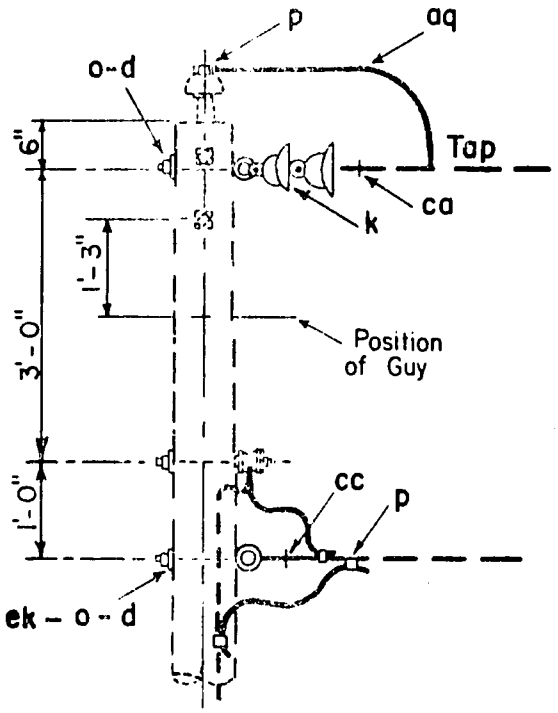
7.6/13.2 KV

C3 3-Phase Vertical Construction, 30° to 60° Angle

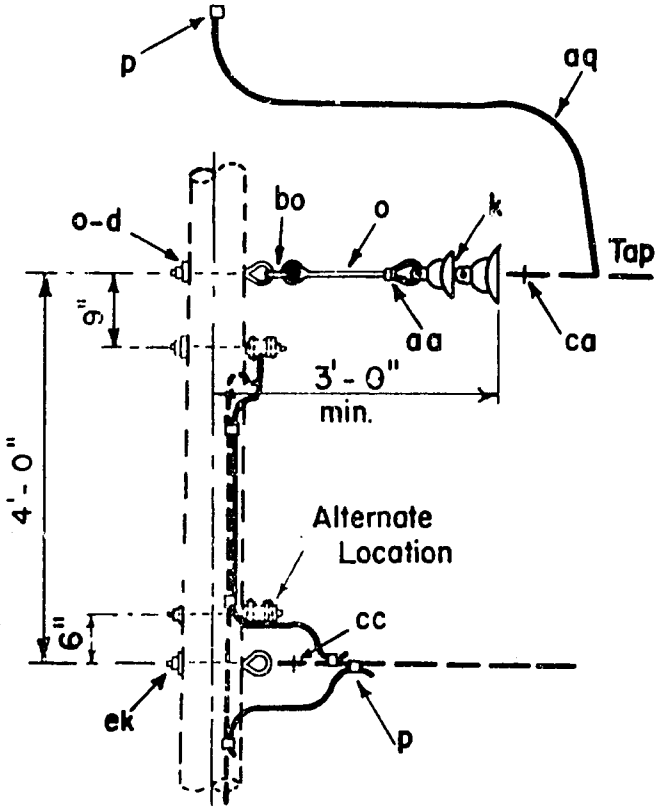
Item	No.	Material	Unit Cost	Extended Cost
d	3	Washer, 2-1/4" x 2-1/4" x 3/16", 13/16" hole	0.24	0.72
k	6	Insulator, suspension	6.00	36.00
o	3	Bolt, eye, 5/8" x req'd length	1.83	5.49
bo	3	Shackle, anchor	5.00	15.00
cd	3	Angle assembly, primary	7.00	21.00
ce	1	Angle assembly, neutral	2.00	2.00
ek	3	Locknuts	0.03	0.09

Total ..... ₱80.30

Note: See guide drawings M29-1 and M29-2.



A5-1



A5-2

Notes: A5-1 assembly may be used with drawings such as: A1, A1-1, A1-2, A2, A2-3

Notes: A5-2 assembly may be used with drawings such as: B1, B1-1, B2, B7, C1, C1-2, C1-3, C1-4, C2-1, C2-2. (See tap assembly Guide M29-1 and M29-2)

Specify A5-2A for tap to existing eyebolt.

		ASSEMBLY UNIT		
		A5-1	A5-2	A5-2A
ITEM	MATERIAL	Nº. REQ'D.	Nº. REQ'D.	Nº. REQ'D.
d	Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole	2	2	
k	Insulator, suspension	2	2	2
o	Bolt, eye, 5/8" x req'd. length	2	3	1
p	Connectors, as required			
aa	Nut, eye, 5/8"		1	3
aq	Jumpers and leads, as required			
ca	Deadend assembly, primary	1	1	1
cc	Deadend assembly, neutral	1	1	1
bo	Shackle, anchor		1	1
ek	Locknut			

7.2/12.5 KV PRIMARY, SINGLE PHASE TAP

CONSTRUCTION STANDARD

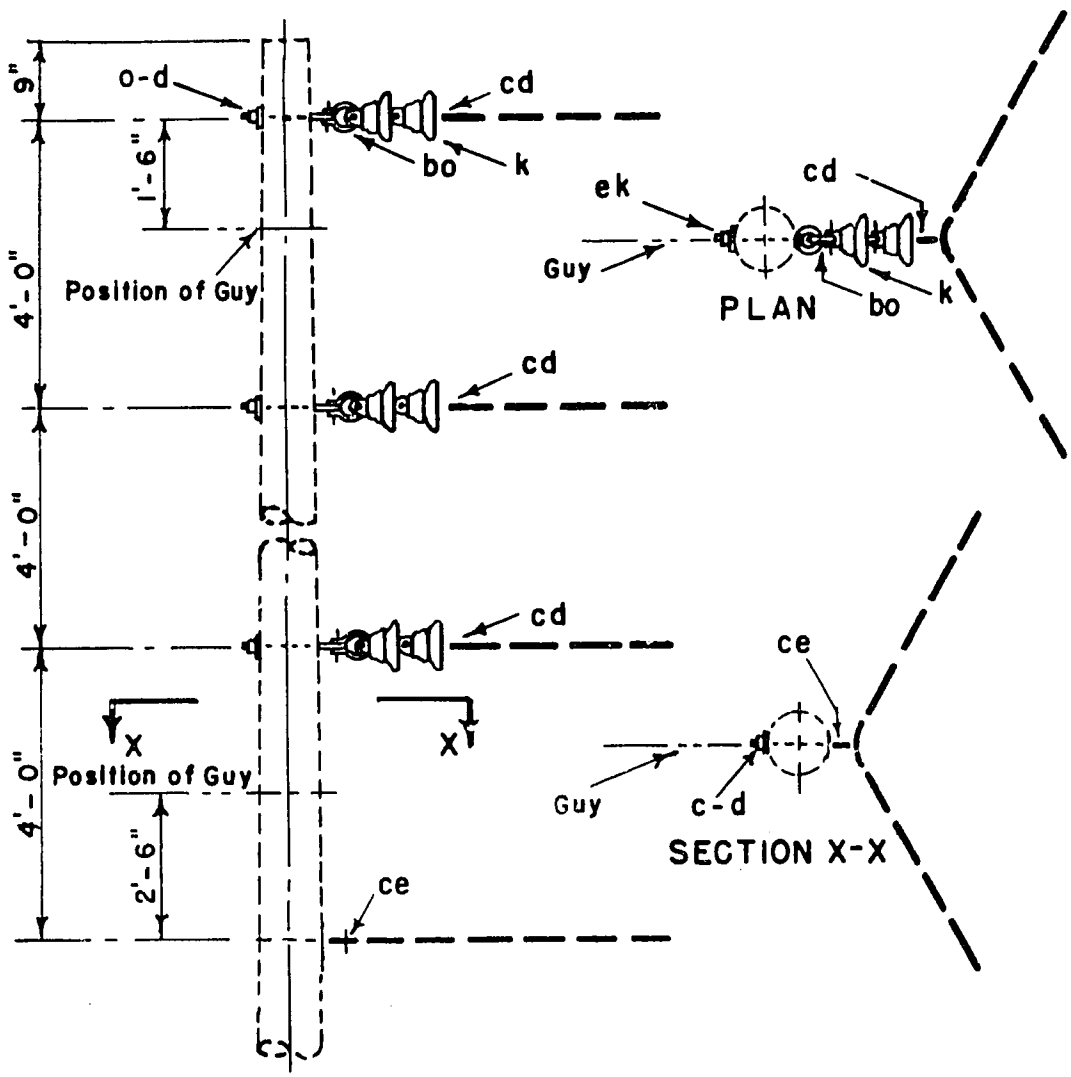
DISTRIBUTION LINE

7.6/13.2 KV

C1 3-Phase Crossarm Construction Single Primary Support

Item	No.	Material	Unit Cost	Extended Cost
a	3	Insulator, pin type	9.00	27.00
b	1	Pin, pole top, 20"	8.60	8.60
c	3	Bolt, machine, 5/8" x req'd length	1.83	5.49
d	5	Washer, 2-1/4" x 2-1/4" x 3/16", 13/16" hole	0.24	1.20
f	2	Pin, crossarm, steel, 5/8" x 10-3/4"	3.30	6.60
g	1	Crossarm, 3-1/2" x 4-1/2" x 8'-0"	14.50	14.50
ek		Locknuts	0.03	0.09
cu	2	Brace, wood, 28"	9.70	19.40
i	2	Bolt, carriage, 3/8" x 4-1/2"	0.11	0.22
j	1	Screw, lag, 1/2" x 4"	0.14	0.14
bs	1	Bolt, single upset, insulated	3.25	3.25
ec	1	Bracket, offset, insulated	8.00	8.00

TOTAL ..... ₱94.49



ITEM	NO.	MATERIAL		ITEM	NO.	MATERIAL	
				bo	3	Shackle, anchor	
d	3	Washer, 2 1/4"x 2 1/4", x 3/16", 13/16" hole		cd	3	Angle assembly, primary	
k	6	Insulator, suspension		ce	1	Angle assembly, neutral	
o	3	Bolt, eye, 5/8" x req'd. length		ek		Locknuts	

7.2/12.5 KV - THREE PHASE
VERTICAL CONSTRUCTION - 30° TO 60° ANGLE

CONSTRUCTION STANDARD

DISTRIBUTION LINE

7.6/13.2 KV

El-2 Single Down Guy, Through Bolt Type

Item	No.	Material	Unit Cost	Extended Cost
c	1	Bolt, machine, 5/8" x req'd length	1.15	1.15
d	1	Washer, 2-1/4" x 2-1/4" x 3/16", 13/16" hole	0.24	0.24
p	2	Connectors as required	0.90	1.80
u	2	Deadend, for guy strand	6.00	12.00
v	1	Guy attachment	1.21	1.21
y	req'd length	Guy wire, S.M., 7-strand	0.30 ft.	15.00
ck	1	Clamp, anchor rod bonding	4.24	4.20
aq	1	Jumper #6 SD copper or equiv.	0.24	2.88
ek	1	Locknuts	0.03	0.03

TOTAL ..... ₱38.51

CONSTRUCTION STANDARD

DISTRIBUTION LINE

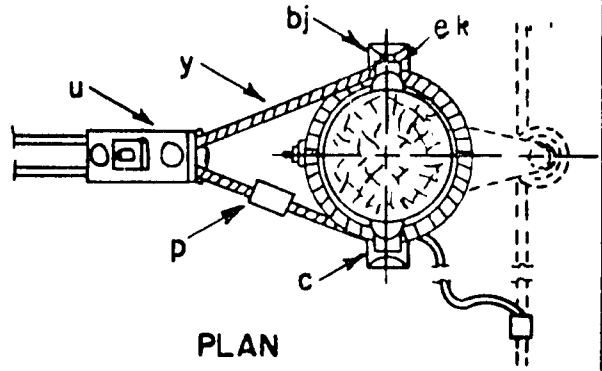
7.6/13.2 KV

E4-2 Single Overhead Guy, Wrapped Type

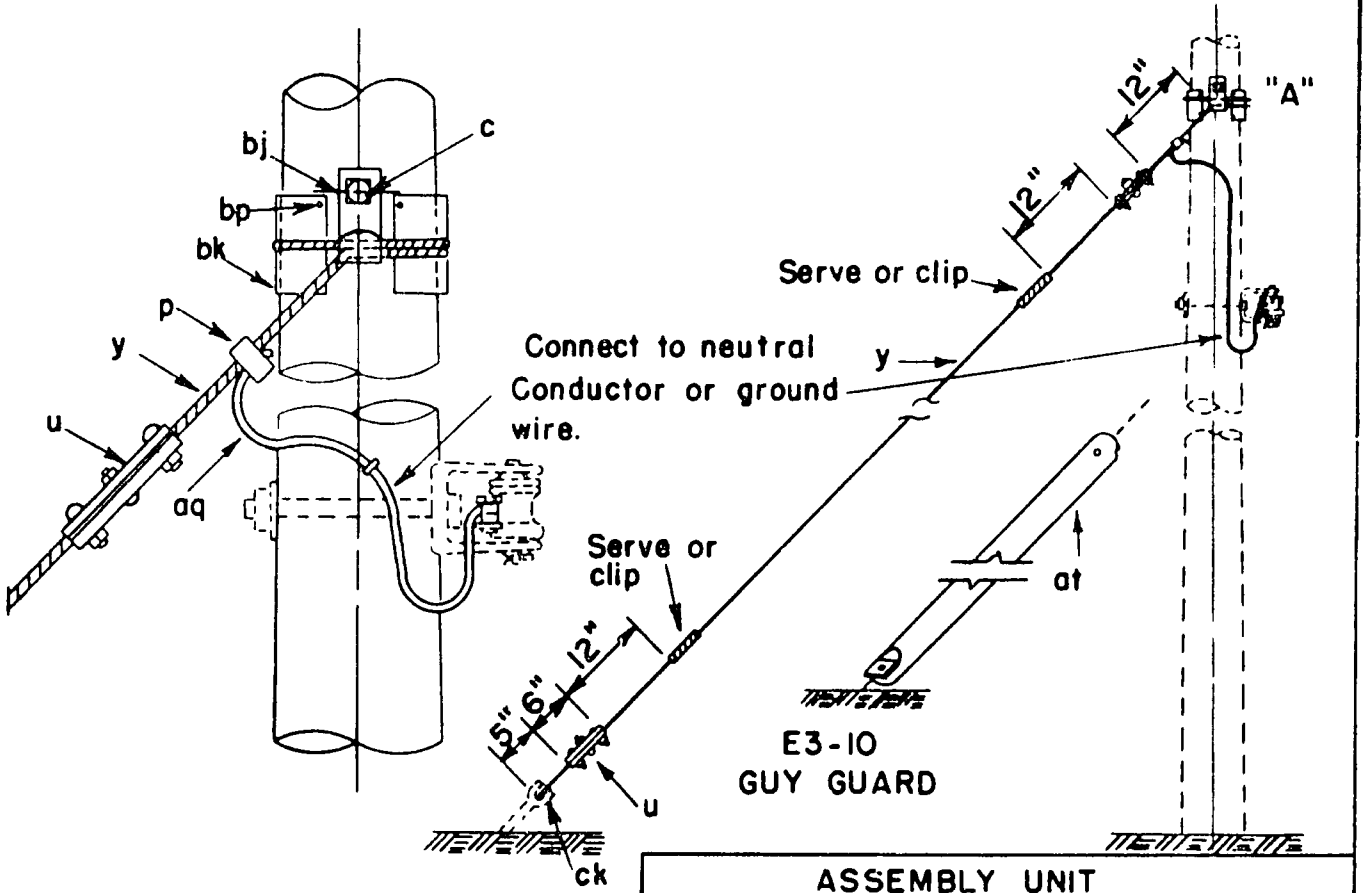
Item	No.	Material	Unit Cost	Extended Cost
c	1	Bolt, machine, 5/8" x req'd length	1.15	1.15
p	4	Connectors as required	0.90	3.60
u	2 medium duty	Deadend for guy strand	6.00	12.00
y	as req'd	Guy wire, S-M, 7-strand	0.30	45.00
aq	1	Jumper, #6 S.D. or equivalent	0.24	1.44
bj	2	Guy Hook, J	0.84	1.68
bk	2	Guy plate 4" x 8", 14 gauge	0.76	1.52
bp	8	Nail, 8 penny, galv.	0.02	0.16
ek		Locknut	0.03	0.03
		TOTAL		₱ 66.58

NOTES:

1. Other accepted and equivalent (item u) guy clamps may be substituted for the 3-bolt clamps shown.
2. Assemblies E1-2 and E1-3 (throughbolt type) are preferred units.



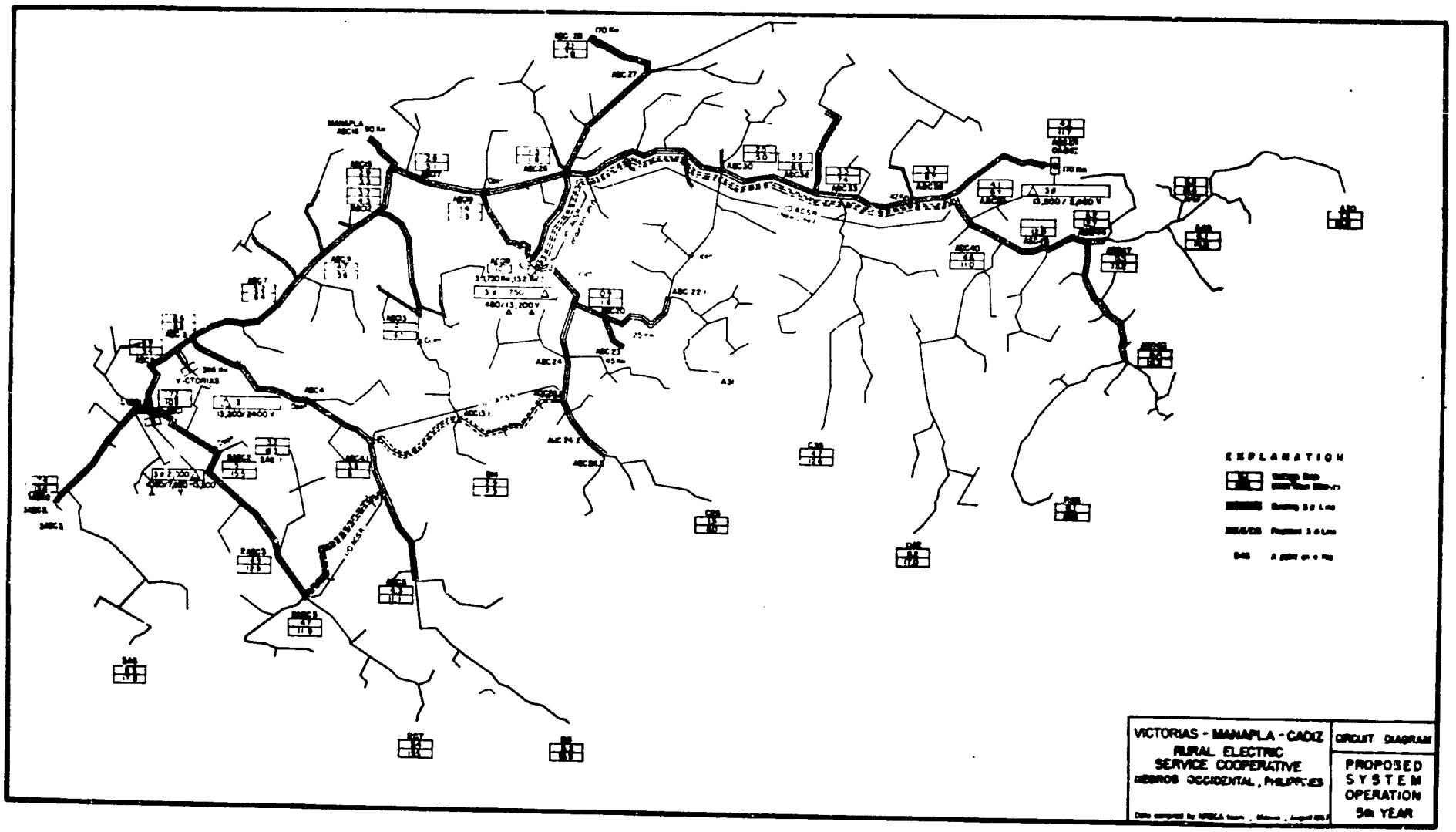
PLAN



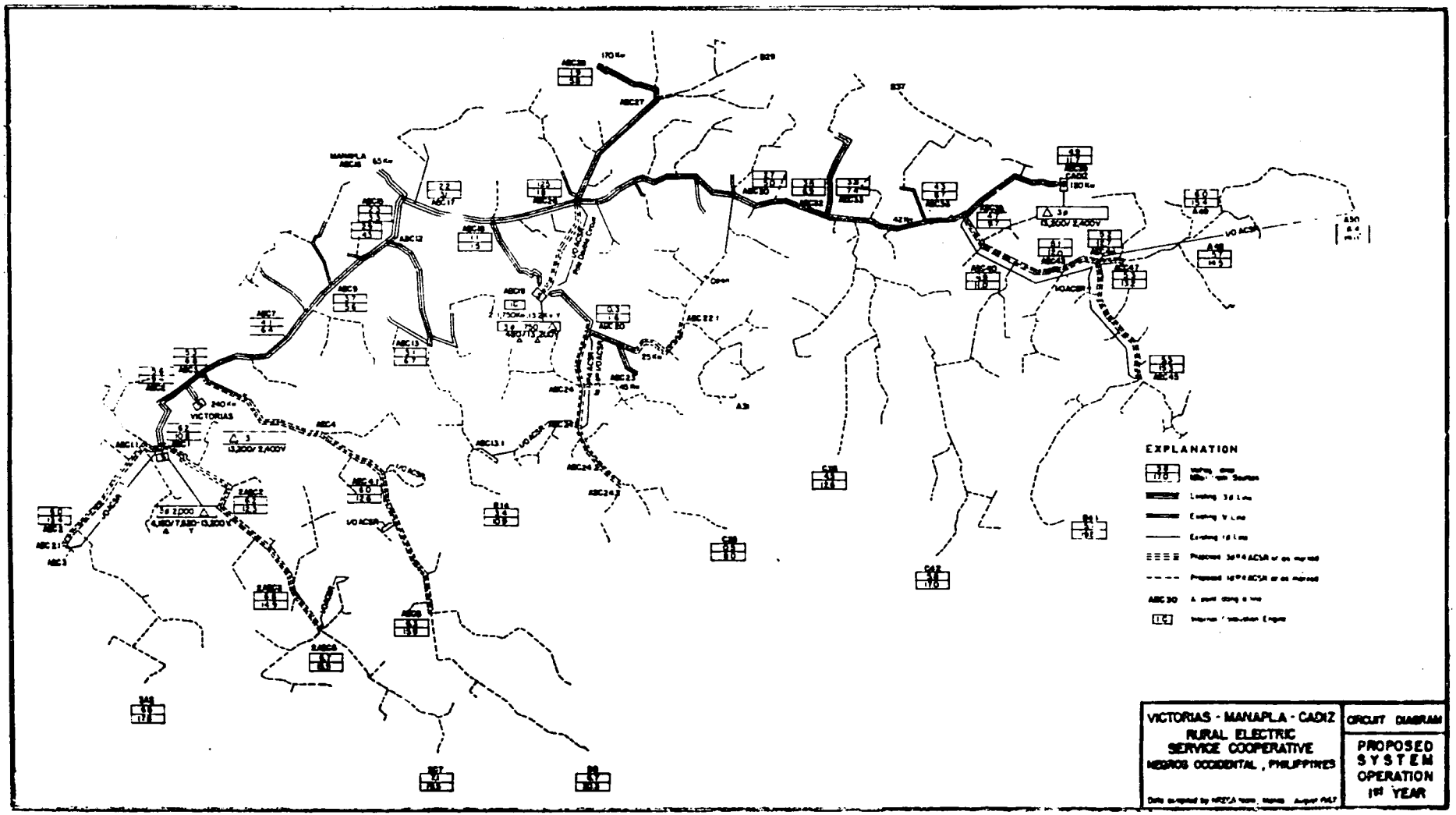
E3-10
GUY GUARD

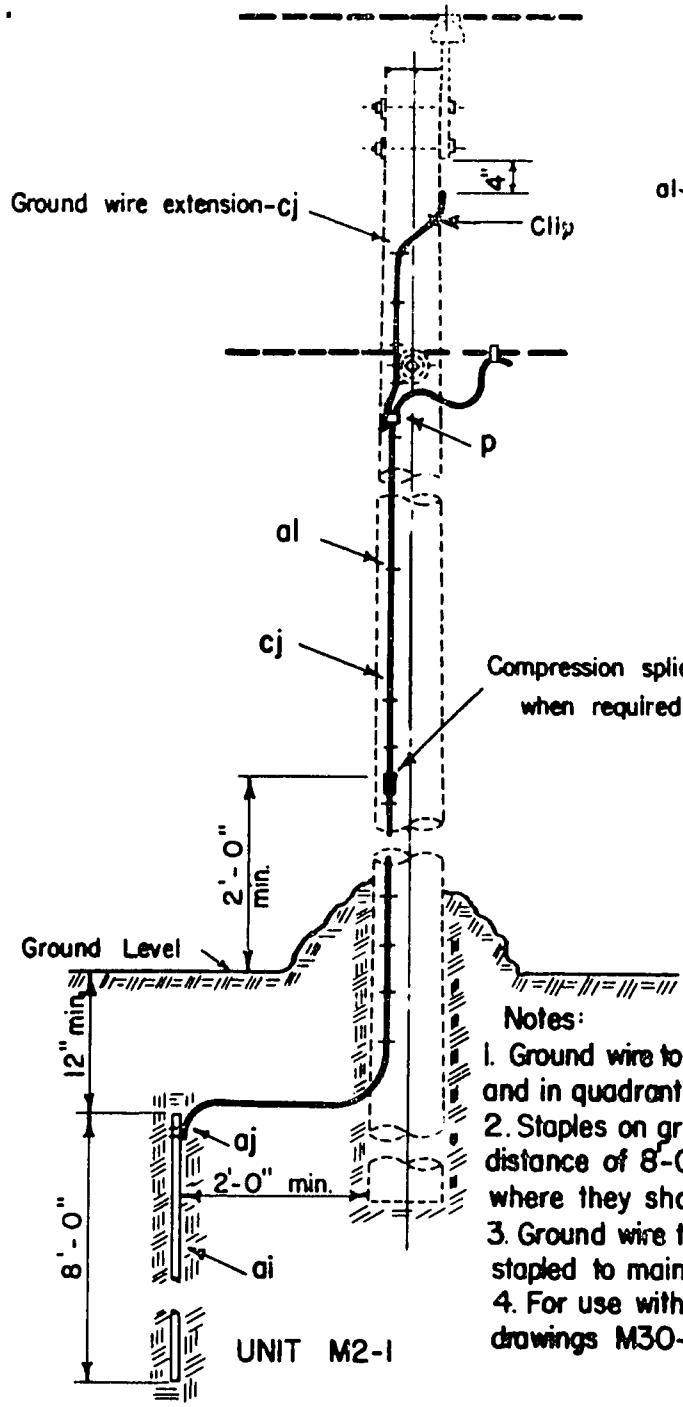
ITEM	MATERIAL		ASSEMBLY UNIT E3-2 3/8" Guy Wire No. REQ'D	E3-3 7/16" Guy Wire No. REQ'D	E3-10 Guy Guard
c	Bolt, machine, 5/8" x req'd length		1	1	
p	Connectors, as req'd				
u	Clamp, guy, 3-bolt, 6" long		2-Medium Duty	2-Heavy Duty	
y	Guy Wire, S-M, 7-strand		req'd length	req'd length	
aq	Jumper, #6 S.D. copper or equiv.				
at	Guy guard, 8' min. length				1
bj	Guy Hook, J		2	2	
bk	Guy Plate, 4" x 8", 14 gauge		2	2	
bp	Nail, 8 penny, galv.		8	8	
ck	Clamp, anchor rod bonding		1	1	
ek	Locknuts				

7.2/12.5 KV.
SINGLE DOWN GUY, WRAPPED TYPE

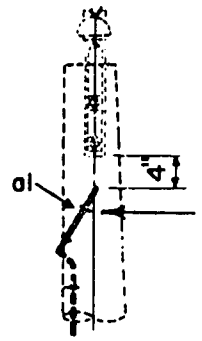

EXPLANATION
VICTORIAS - MANAPLA - CADIZ
RURAL ELECTRIC
SERVICE COOPERATIVE
NEGROS OCCIDENTAL, PHILIPPINES
CIRCUIT DIAGRAM
PROPOSED
SYSTEM
OPERATION
5th YEAR

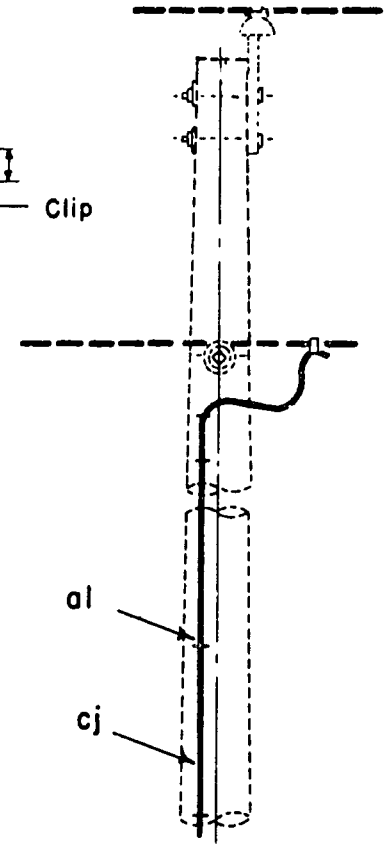
12


EXPLANATION
VICTORIAS - MANAPLA - CADIZ
RURAL ELECTRIC
SERVICE COOPERATIVE
NEGROS OCCIDENTAL , PHILIPPINES
CIRCUIT DIAGRAM
PROPOSED
SYSTEM
OPERATION
1ST YEAR



UNIT M2-I





UNIT M2-II
similar to Unit M2-I
except as shown.

Notes:

1. Ground wire to be located on same side as Neutral Conductor and in quadrant opposite climbing space or pole top pin.
2. Staples on ground wire shall be 2'-0" apart, except for a distance of 8'-0" above ground and 8'-0" from top of pole where they shall be 6" apart.
3. Ground wire to clear all hardware by 2" min. and shall be stapled to maintain this position.
4. For use with V and 3-phase assemblies refer to guide drawings M30-1 and M30-2.

ITEM	MATERIAL	ASSEMBLY UNIT M2-I	ASSEMBLY UNIT M2-II	
p	Connector	2	1	
ai	Rod, ground, 5/8" dia. min.	1	1	
aj	Clamp, ground rod	1	1	
al	Staples, ground wire, 3/16"x1 1/2"x#9, as req'd.			
al	Ground wire clip	1		
cj	Ground wire, #6 S.D. copper or equiv.	1	1	

GROUNDING ASSEMBLY - GROUND ROD TYPE

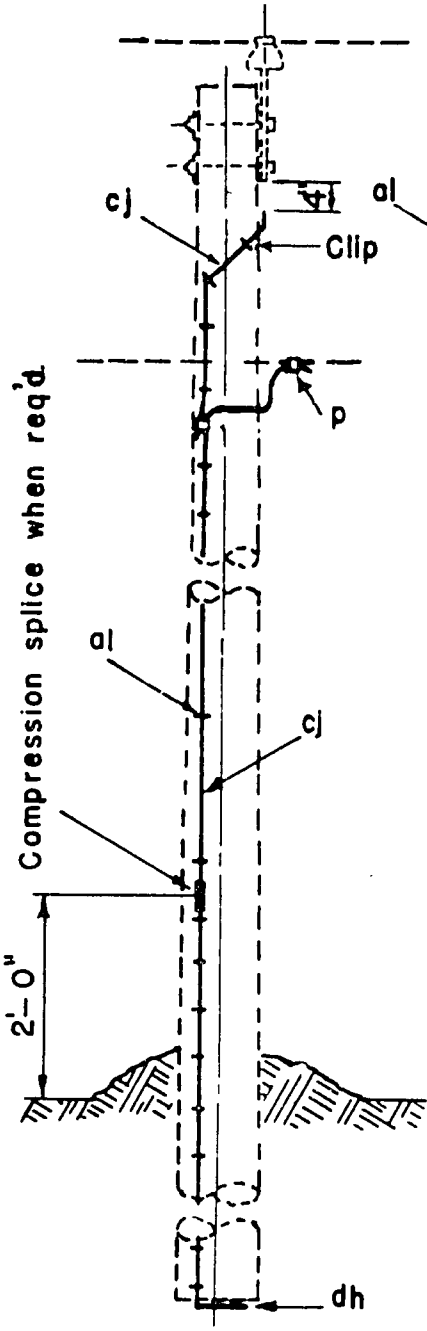
CONSTRUCTION STANDARD

DISTRIBUTION LINE

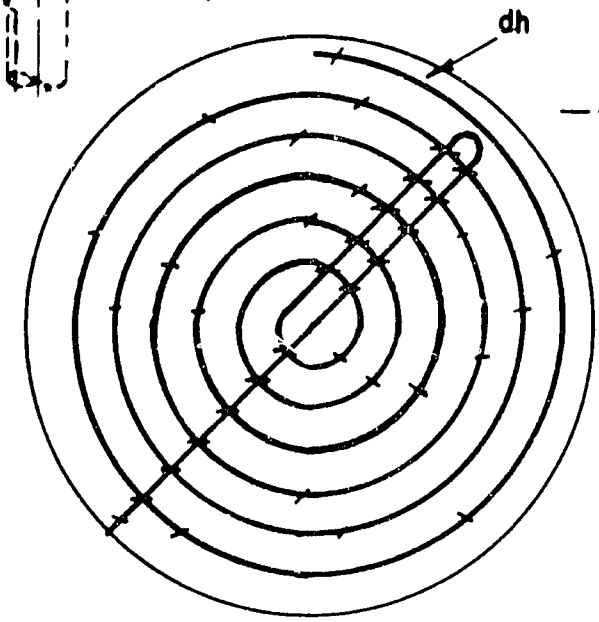
7.6/13.2 KV

M2-2 Pole Protection Assembly-Butt Type

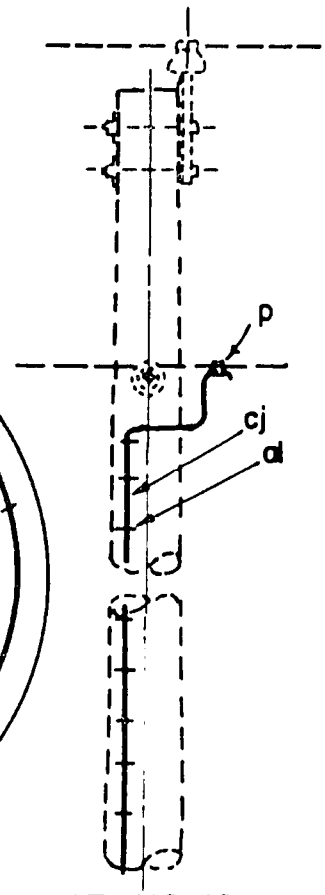
Item	No.	Material	Unit Cost	Extended Cost
p	2	Connectors	0.90	1.80
al		Staples, ground wire, 3/16" x 1 1/2" x #9, as req'd	0.02	2.00
cj	1	Ground wire, #6 S.D. copper or equivalent	0.24	12.00
dh	1	Butt type grounding device coil or plate	0.24	3.60
cj	1	Ground wire extension, #6 S.D. copper	0.24	2.40
al	1	Ground Wire clip	0.02	2.00
		TOTAL		₱ 23.80



UNIT M2-2



PLAN OF COIL TYPE GROUND



UNIT M2-12

Notes:

1. Ground wire to be located on same side as neutral conductor and in quadrant opposite climbing space or pole top pin.
2. Staples on ground wire shall be 2'-0" apart, except for a distance of 8'-0" above ground and 8'-0" from top of pole where they shall be 6" apart.
3. Ground wire to clear all hardware by 2" min. and shall be stapled to maintain this position.
4. For use with V and 3-phase assemblies refer to guide drawings M30-1 and M30-2.

		ASSEMBLY UNIT		
ITEM	MATERIAL	M 2-2	M 2-12	
P	Connectors	2	1	
al	Staples, ground wire, 3/16" x 1½" x #9, as req'd.			
cj	Ground wire, #6 S.D. Copper or equiv'nt	1	1	
dh	Butt type grounding device, coil or plate	1	1	
cj	Ground wire extension, #6 S.D. Copper	1		
al	Ground wire clip	1		

POLE PROTECTION ASSEMBLY- BUTT TYPE

COST ESTIMATES OF
13.8 KV DISTRIBUTION LINE

1 KM - SINGLE PHASE - VERTICAL CONSTRUCTION - #4 ACSR
AVERAGE SPAN - 125 METERS (8 SPANS/KM)

Items	Quantity	Unit Cost	Extended Cost
Poles	9	110.00	990.00
Pole Top Units			
A1	6	23.93	143.58
A2	1	45.34	45.34
A3	1	28.07	28.07
A5-2	1	42.38	42.38
Conductor			
#4 ACSR	2000M	0.685	1,370.00
Guys			
E1-2	1	38.51	38.51
E2-2	1	66.07	66.07
E3-2	1	46.61	46.61
E10	1	9.85	9.85
Anchors			
F1-2	2	14.45	28.90
Miscellaneous			
M2-1	3	26.52	79.56
M2-2	5	23.80	119.00
	TOTAL MATERIAL COST		₱ 3,007.87
	Add Labor @ 20%		₱ 601.57
	TOTAL L&M		₱ 3,609.44
	USE		₱ 3,610.00

COST ESTIMATES OF
13.8 KV DISTRIBUTION LINE

1 KM - SINGLE PHASE - VERTICAL CONSTRUCTION - #2 ACSR
AVERAGE SPAN - 125 METERS (8 SPANS/KM.)

Items	Quantity	Unit Cost	Extended Cost
Poles	9	110.00	990.00
Pole Top Units			
A1	6	23.93	143.58
A2	1	45.34	45.34
A3	1	28.07	28.07
A5-2	1	42.38	42.38
Conductors			
#2 ACSR	1000 M	0.722	722.00
#4 ACSR	1000 M	0.685	685.00
Guys			
E1-2	1	38.51	38.51
E2-2	1	66.07	66.07
E3-2	1	46.61	46.61
E10	1	9.85	9.85
Anchors			
F1-2	2	14.45	28.90
Miscellaneous			
M2-1	3	26.52	79.56
M2-2	5	23.80	119.00
	TOTAL MATERIAL COST		- ₱ 3,044.87
	Add Labor @ 20%		- ₱ 608.97
	TOTAL L & M		- ₱ 3,653.84
	USE		- ₱ 3,650.00

COST ESTIMATES OF
13.8 KV DISTRIBUTION LINE

1 KM - THREE PHASE CONSTRUCTION - #4 ACSR
AVERAGE SPAN - 125 METERS (8 SPANS/KM.)

Items	Quantity	Unit Cost	Extended Cost
Poles	9	180.00	1,620.00
Pole Top Units			
C1	6	94.49	566.94
C2	1	172.32	172.32
C3	1	80.30	80.30
A5-2	1	42.38	42.38
Conductor			
#4 ACSR	4000 M	0.685	2,740.00
Guys			
E3-2	3	46.61	139.83
E4-2	1	66.58	66.58
E10	1	9.85	9.85
Anchors			
F1-3	3	14.65	43.95
Miscellaneous			
M2-1	3	26.52	79.56
M2-2	5	23.80	119.00

TOTAL MATERIAL COST - ₱ 5,680.71

Add Labor @ 20% - ₱ 1,136.14

TOTAL L & M - ₱ 6,816.85

USE - ₱ 6,820.00

Secondary

Items	Quantity	Unit Cost	Extended Cost
Poles	10	110.00	1,100.00
Conductor			
#4 ACSR	3000 M	0.685	2,055.00
Guys			
E1-2	4	38.51	154.04
E10	2	9.85	19.70
Anchors			
F1-2	4	14.45	57.80
Secondary Unit			
J5	16	4.07	65.12
J6	6	4.54	27.24
J8	8	3.52	28.16
Miscellaneous			
M2-1	5	26.52	132.60
M2-2	5	23.80	119.00

TOTAL MATERIAL COST - ₱ 3,758.66

Add Labor @ 20% - ₱ 751.73

TOTAL L & M - ₱ 4,510.39

USE - ₱ 4,510.00

Secondary Underbuild

Items	Quantity	Unit Cost	Extended Cost
Conductor			
#4 ACSR	2000 M	0.685	1,370.00
Guys			
E1-2	4	38.51	154.04
E10	2	9.85	19.70
Anchors			
F1-2	4	14.45	57.80
Secondary Units			
J5	12	4.07	48.84
J6	4	4.54	18.16

TOTAL MATERIAL COST - ₱1,668.54

Add Labor @ 20% - ₱ 333.71

TOTAL L & M - ₱2,002.25

USE - ₱2,000.00

COST ESTIMATE OF
13.8 KV DISTRIBUTION LINE

1 KM - THREE PHASE CONSTRUCTION - #2 ACSR
AVERAGE SPAN - 125 METERS (8 SPANS/KM.)

Items	Quantity	Unit Cost	Extended Cost
Poles	9	180.00	1,620.00
Pole Tops Units			
C1	6	94.49	566.94
C2	1	172.32	172.32
C3	1	80.30	80.30
A5-2	1	42.38	42.38
Conductors			
#4 ACSR	1000 M	0.685	685.00
#2 ACSR	3000 M	0.722	2,166.00
Guys			
E3-2	3	46.61	139.83
E4-2	1	66.58	66.58
E10	1	9.85	9.85
Anchors			
F1-3	3	14.65	43.95
Miscellaneous			
M2-1	3	26.52	79.56
M2-2	5	23.80	119.00

TOTAL MATERIAL COST - ₱ 5,791.71

Add Labor @ 20% - ₱ 1,158.34

TOTAL L & M - ₱ 6,950.05

USE - ₱ 6,950.00

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COST ESTIMATES OF
13.8 KV DISTRIBUTION LINE

1 KM - THREE PHASE CONSTRUCTION - #1/0 ACSR
AVERAGE SPAN - 125 METERS (8 SPANS/KM.)

Items	Quantity	Unit Cost	Extended Cost
Poles	9	180.00	1,620.00
Pole Top Units			
C1	6	94.49	566.94
C2	1	172.32	172.32
C3	1	80.30	80.30
A5-2	1	42.38	42.38
Conductor			
#4 ACSR	1000 M	0.685	685.00
#1/0 ACSR	3000 M	0.758	2,274.00
Guys			
E3-2	3	46.61	139.83
E4-2	1	66.58	66.59
E10	1	9.85	9.85
Anchors			
F1-3	3	14.65	43.95
Miscellaneous			
M2-1	3	26.52	79.56
M2-2	5	23.80	119.00

TOTAL MATERIAL COST - ₱ 5,899.71

Add Labor @ 20% - ₱ 1,179.94

TOTAL L & M - ₱ 7,079.65

USE - ₱ 7,080.00

Service #4 ACSR Triplex

Items	Quantity	Unit Cost	Extended Cost
Conductor			
#4 AL. Triplex	1000 M	0.838	838.00
Guys			
E1-2	3	38.51	115.53
E10	2	9.85	19.70
Anchors			
F1-2	3	14.45	43.35
Service Units			
K11	66	3.57	235.62
	TOTAL MATERIAL COST		- ₱ 1,252.00
	Add Labor Cost @ 20%		- ₱ 250.00
	TOTAL L & M		- ₱ 1,502.00
	USE		- ₱ 1,500.00

Service - # 8NEOP.

Items	Quantity	Unit Cost	Extended Cost
Conductor			
#8NEOP.	3000 M	0.201	603.00
Guys			
E1-2	3	38.51	115.53
E10	2	9.85	19.70
Anchors			
F1-2	3	14.45	43.35
Service Units			
K10	99	0.35	34.65
K11	99	3.57	353.43
	TOTAL MATERIAL COST -		₱1,170.00
	Add Labor Cost @ 20% -		₱ 234.00
	TOTAL L & M COST -		₱1,404.00
	USE -		₱1,400.00

SECTION 7

GENERATION

GENERATION

SECTION - 7

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GENERATION

A. Description:

The Cooperative operates now on power purchased from the Victorias Milling Company. This power source, and encouragement from the Company, were necessary to get the system started. There are obvious benefits to the Cooperative in the arrangement, but also disadvantages with respect to continuity of operation and plans for expansion.

VMC operates generating facilities for its sugar mill, residential compound, and associated facilities. There are four steam-turbines at the mill plus two diesel units. A third diesel unit is installed at Manapla. Capacities are as follows:

Victorias Mill:

Turbine "A"	3500 KW
Turbine "B"	1000 KW
Turbine "C"	1250 KW
Turbine "D"	1150 KW
TOTAL FOR TURBINES	6900 KW
Diesel - Sulzer	700 KW
Diesel - Man	900 KW
TOTAL FOR DIESELS	1600 KW

Manapla:

Diesel - Atlas	680 KW

Process steam at the mill, and steam for the turbine generators is produced by burning bagasse - the waste product after the cane milling process. During plant operation the turbines furnish the general power requirements, with the diesels used for peaking or to provide deficiencies resulting from steam shortage. One day each week the mill is shut down for cleaning purposes, and during the off-milling season - a period of about six weeks each year - is closed for maintenance work. During these times power is supplied by the diesel units.

VMC has agreed to supply VRESCO with up to 1000 KW during those times when the mill is running. There is no load-factor commitment on energy. During the periods when the turbines are not running the Cooperative is restricted to the surplus available from the Manapla diesel plant, and this runs around 400 KW. The diesels at Victorias are used for the loads at the compound. The Cooperative load has already peaked at 800 KW so firm power is not available and sales must be curtailed at times. Power and energy is supplied on a "Cost" basis, with the Cooperative currently paying 4.3c./kwh. At the end of each year there is an accounting of the cost of production and an adjustment made to compensate for errors. It is expected that there will normally be a refund to the Cooperative.

These arrangements do not permit the Cooperative to follow the concept of service at all times, with adequate power for all consumers. VMC envisions a steady growth each year in their own power requirements so the situation is likely to get worse for the Cooperative unless additional generating facilities are made available.

B. Power Supply Alternatives:

A brief review has been made of several alternative methods by which the Cooperative's power needs can be supplied over a long-range program:

Method #1:

Install independent steam-turbine facilities using surplus bagasse as fuel.

This idea is attractive because surplus bagasse could normally be obtained for minimal cost. It has a btu rating of about 4000/lb. and boilers are readily available for its use. However, the operation of the VMC mill leaves no surplus waste product. Other mills on the island do have surplus, but due to its bulk the transportation problem is prohibitive. Generating plants could, perhaps, be built in other areas to use this available fuel but this offers no advantage to VRESCO at this time. This matter has been discussed with VMC staff and engineers and we conclude that the idea is not practical.

Method #2:

Develop hydro-power sources from multipurpose projects on major rivers of Negros.

This idea requires action by the Bureau of Public Works and the National Power Corporation. There is not enough data available on which any judgment can be made at this time. Major hydro projects can normally offer low-cost power advantages, and these could be of benefit to VRESCO and other utilities. We commend a study of hydro potential to the appropriate authorities, thinking that it may offer long-range benefits to the entire island. VRESCO's problems, however, are immediate, and we must look to quicker remedies.

Method #3:

Purchase VRESCO power requirements from the private utility at Bacolod - "Diaz Electric Service Company".

Diaz Electric operates an electric power system which serves Bacolod and its environs. They also have the franchise for Talisay, about 7 kms. north of Bacolod, though the two systems are not interconnected at this time. A new generating plant has recently been built at Bacolod and consists of one 3000 KW diesel unit. An old plant in the town is still operating to supply peaks, but will be phased out as new units are added to the new plant. The generating plant at Talisay is very small and inadequate and will undoubtedly be replaced with service from the Bacolod plant. A second 3000 KW unit is proposed for installation in 1969 to meet the growing demands of the system.

The management and staff have been very helpful to our NRECA team. Much information has been obtained relative to diesel-generator costs, operation and maintenance for the area. Their plant is well constructed, well maintained and has room for expansion. We have discussed with them the purchase of the Cooperative's power needs and the idea has considerable merit. The Company would have to accelerate their schedule for the installation of new generators since the Cooperative load could not be served from normally available surplus. The Cooperative would probably have to purchase an additional unit for the plant because of the financial problems faced by the Company. It would also be necessary to build a step-up substation, 50 kilometers of transmission line to the load-center at Manapla, and a step-down substation at the line terminus. This construction would add considerable cost to the project, but there would be compensating benefits arising from the opportunity to serve other loads along the route of the transmission line, such as the poblacions of Talisay, Silay and Saravia.

Preliminary figures from the Company show an average cost/kwh, at the plant bus, of 7c. This figure can undoubtedly be refined

but probably not to an extent which makes it obviously attractive to the Cooperative. It must be considered along with compensating advantages, one of which is the availability of competent plant operators.

We have not adopted this idea in our planning for this report, mainly because it would enlarge the scope of the project and we believe it necessary, for this first pilot project, to impose some practical limits on size. However, such a plan as this should be given due consideration in future detailed planning.

Method #4:

The Cooperative should build and operate its own generating plant, with diesel-electric units, near the system load-center.

This plan will certainly ensure that the Cooperative, with control over the construction and operation of the generating facilities, will have the power available to supply its needs on a firm basis. Generation can be arranged at distribution voltage to eliminate substations. With generation at the load-center the system can be served without transmission lines. However, it means that VRESCO and VMC will each be operating generating facilities adjacent to each other, and this leads to consideration of plans for mutual benefits. The following is the plan which we have adopted for consideration in the report.

Method #5:

The Cooperative shall purchase diesel-generating units sized according to its own needs. These shall be installed in an extension to the existing VMC generating station in Mamapla and operated by their trained crews.

Preliminary discussions have been held with VMC staff and we are encouraged to hope that agreement can be reached along these lines, so that both parties may benefit.

The benefits to VRESCO will be:

(1) Operation and maintenance of generating units by competent personnel backed up with adequate tools and equipment.

(2) The units will be operated as part of an integrated plant with appropriate lower average costs, i.e. surplus power from the turbines may be used to the greatest possible extent.

(3) Emergency reserves available from VMC generators.

to facilitate installation, operation and maintenance. The choice of unit size has been determined from an analysis of investment required and the year in which it must be made. The economies in operation of larger units have been weighed against flexibility which may be obtained from a larger number of smaller units. We have also plotted the firm power which will be available - this being the capacity to serve the load with the largest unit down for repair. It will be seen that the Cooperative may expect firm power over the ten-year period under this plan. We have used annual KW peaks derived from annual load factor and consumption, and have matched them with rated load values of generators. Monthly peaks may be slightly higher during some times each year but we assume these can be handled through the overload capacity of the units. On this basis we believe that generating units should be planned as follows:

Initial installation	2 units each 1750 KW.
3rd year	1 unit of 1750 KW.
6th year	1 unit of 1750 KW.

We have given careful consideration to the type of prime-mover to be used. Consultations have been held with suppliers, engineers and experienced utility operators. The choice lies between slow and high-speed units. The high-speed units have the advantages of lower initial cost and ease of installation (they are available in "package" units). Slow-speed units have the advantages of lower fuel costs and reduced maintenance. There appears to be general agreement that slow-speed units will best serve the Cooperative's needs and we have proceeded on that basis.

D. Generator Cost:

An average cost per KW of installed capacity has been derived as follows. Again, we are indebted to suppliers and to the Diaz Electric Service Company of Bacolod for help in details of cost.

Cost of 1750 KW Unit:

Engine-Generator (C&F Manila)	₱ 830,000
Switchgear	65,000
Marine insurance	7,500
Stevedoring, arrastre, storage	3,000
Barge and trucking	8,500
Supervising engineer	15,000
Foundation	15,000
Labor	15,000
Materials	10,000
Misc. fees	1,000
	₱ 970,000

Add one-quarter of the building price, fuel tank, and overhead crane assembly - (assuming these facilities will service four units).

Building	₱85,000		
Crane	52,000		
Fuel tank	50,000		
	₱160,000	x 25% -	₱ 40,000
TOTAL INSTALLED COST			₱1,010,000
Average Cost/KW			₱ 580
USE			₱ 600

E. Annual Cost per KWH Generated:

Using investment costs so derived we have calculated average annual costs per KWH generated, for each year during a ten-year period. We have assumed the use of Bunker "C" fuel @ ₱72.00 per metric ton - this being a current price at the Victorias Mill. Interest charges of 3-1/2%, depreciation of 5%, and operation and maintenance of 2% have been applied.

Annual Cost/KWH Generated

Year	Centavos/KWH
1	5.69
2	4.86
3	6.60
4	6.00
5	5.55
6	5.88
7	5.49
8	5.16
9	4.91
10	4.65

The derivation of cost each year is shown on the pages which follow. These costs make no allowance for benefits to be obtained from surplus energy from VMC steam-turbines. Thus the estimates are probably high and should be more than adequate to take care of fluctuations in variable factors, such as fuel costs, which may occur during a ten-year period.

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(4) Firm capacity more readily available through use of VMC generators.

The benefits to VMC will be:

(1) An opportunity to purchase their growing power needs and thus defer their own capital improvements.

(2) Existing operating and overhead costs for their power facilities can be spread over a broader base.

(3) Standby power available to meet emergencies or to facilitate routine maintenance.

(4) A continuing market for their surplus power from the turbines.

(5) Public relations with the Planters in their district.

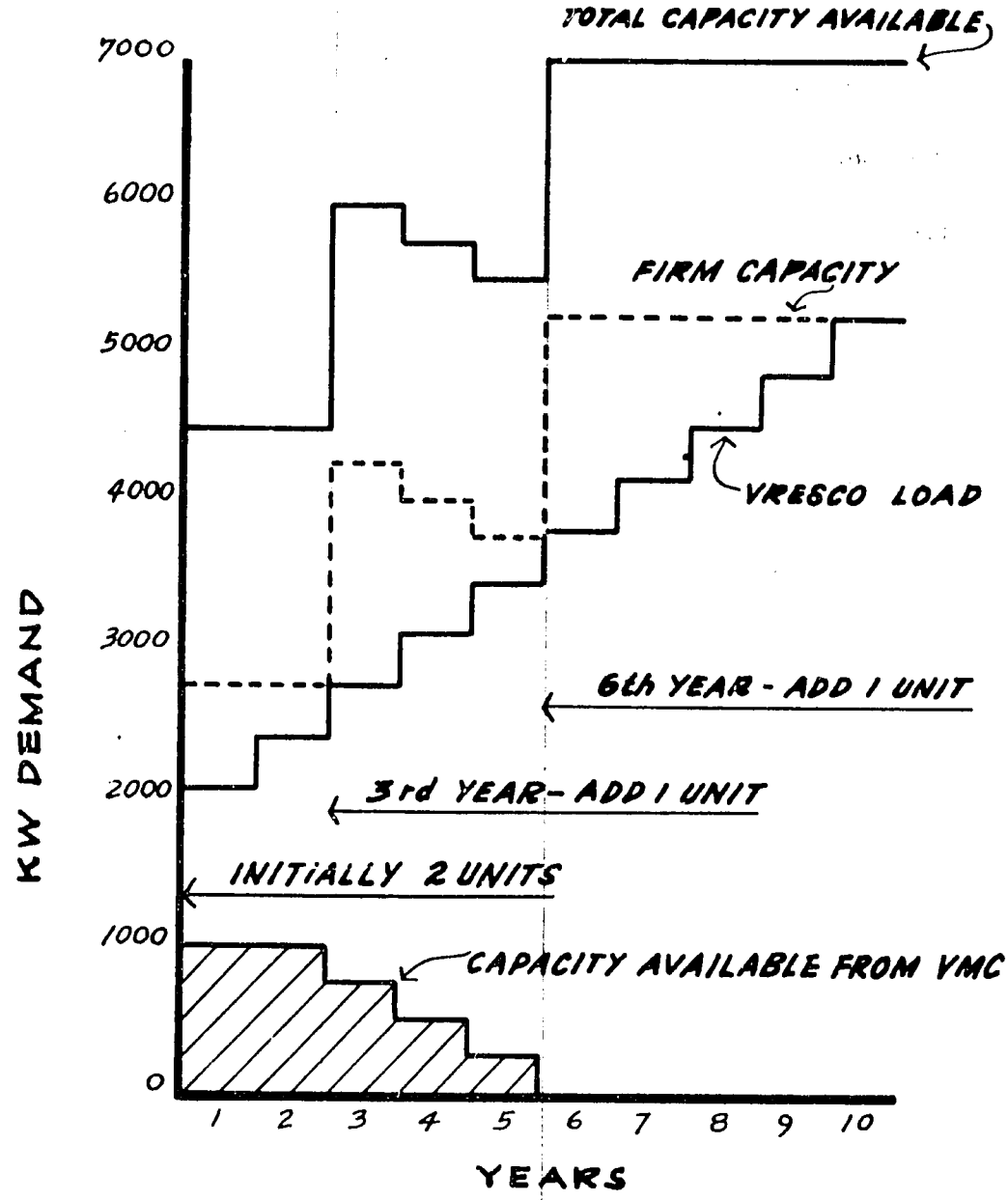
Our planning for this report has been based on the assumption that a reasonable agreement will be made with VMC to provide for their operation of the new units. The agreement will recognize that benefits also accrue to VMC.

C. System Demand:

The annual peak demands of the Cooperative's system have been computed from consumption figures derived elsewhere in the report. Losses have been added to reflect generation requirements.

Year	KWH Generated	Load Factor	KW
1st	6,811,200	38%	2050
2nd	8,474,400	40	2400
3rd	10,060,700	42	2750
4th	11,863,800	44	3100
5th	13,766,800	46	3450
6th	15,980,400	48	3800
7th	18,194,400	50	4150
8th	20,516,300	52	4500
9th	22,969,000	54	4850
10th	25,858,600	56	5250

These annual peak loads have been plotted as shown on the following page. On this same graph we show the KW capacity which we may expect to be available from VMC and the capacity obtained from new generating units. We have concluded that the Cooperative's load can best be served, over the ten-year period, by four diesel units each rated at 1750 KW. The units should be identical



REQUIRED GENERATING CAPACITY BY VRESCO

INITIAL INSTALLATION	2 UNITS	EACH	1750 KW
3rd YEAR	1 UNIT	of	1750 KW
6th YEAR	1 UNIT	of	1750 KW
TOTAL CAPACITY			7000 KW

ANNUAL COST PER KWH GENERATED

Fuel Cost:

Bunker "C" @ ₱72/metric ton (from VMC records)

$\therefore$ 1 lb = $\frac{₱72.00}{2205}$ = 3.27 c.

Assume units average 1/2 - load and use .545 lb./kwh

$\therefore$ fuel cost/kwh = 3.27 c. x .545 = 1.78 c.

Lube Oil Cost:

Assume lube oil @ 6% of fuel oil cost

$\therefore$ lube oil cost/kwh = 1.78c x 0.06 = 0.11 c.

1st Year Costs:

Capital investment	₱	2,460,000 *
KWH		6,811,200
Interest @ 3 1/2%	₱	86,200
Depreciation @ 5%		123,000
Fuel @ 1.78 c./kwh		121,200
Oil @ 0.11 c./kwh		7,500
Operation & Maintenance @ 2%		49,200
TOTAL	₱	387,100

Total cost/kwh = $\frac{₱\ 387,100}{6,811,200}$ = 5.69 c./kwh

* 3500KW @ ₱600 / 10% contingency & overhead / 7% engineering.

2nd Year Costs:

Capital Investment	₱ 2,460,000
KWH	8,474,400
Fuel consumption	0.525 lb./kwh = 1.71 c./kwh
Interest @ 3 1/2%	₱ 86,200
Depreciation @ 5%	123,000
Fuel @ 1.71 c./kwh	145,000
Oil @ 0.10 c./kwh	8,500
Operation & Maintenance @ 2%	49,200
TOTAL	₱ 411,900

Total cost/kwh = $\frac{₱\ 411,900}{8,474,400}$ = 4.86 c./kwh

3rd Year Investment:

Capital Investment	₱ 3,690,000 *
KWH	10,060,680
Fuel consumption	0.505 lb./kwh = 1.65 c./kwh
Interest @ 3 1/2%	₱ 129,200
Depreciation @ 5%	194,500
Fuel @ 1.65 c./kwh	166,000
Oil @ 0.10 c./kwh	100,600
Operation & Maintenance @ 2%	73,800
TOTAL	₱ 664,100

Total cost/kwh = $\frac{₱\ 664,100}{10,060,680}$ = 6.60 c./kwh

* 5250 KW @ ₱600 / 10% contingency & overhead / 7% Engineering.

4th Year Costs:

Capital Investment	₱	3,690,000
KWH		11,863,800
Fuel Consumption		0.505 lb./kwh = 1.65 c./kwh
Interest @ 3 1/2%	₱	129,200
Depreciation @ 5%		194,500
Fuel @ 1.65 c./kwh		195,000
Oil @ 0.10 c./kwh		118,600
Operation & Maintenance @ 2%		73,800
TOTAL	₱	711,100

Total cost/KWH = $\frac{₱\ 711,100}{11,863,800}$ = 6.00 c./kwh

5th Year Cost:

Capital Investment	₱	3,690,000
KWH		13,766,800
Fuel Consumption		0.505 lb/kwh = 1.65 c./kwh
Interest @ 3 1/2%		129,200
Depreciation @ 5%		194,500
Fuel @ 1.65 c./kwh		227,000
Oil @ 0.10 c./kwh		138,000
Operation & Maintenance @ 2%		73,800
TOTAL	₱	762,500

Total Cost/KWH = $\frac{₱\ 762,500}{13,766,800}$ = 5.55 c./kwh

6th Year Cost:

Capital Investment	₱ 4,914,000*
KWH	15,980,400
Fuel Consumption	0.505 lb/kwh = 1.65 c./kwh
Interest @ 3 1/2%	₱ 172,000
Depreciation @ 5%	245,700
Fuel @ 1.65 c./kwh	263,700
Oil @ 0.10 c./kwh	159,800
Operation & Maintenance @ 2%	98,300
TOTAL	₱ 939,500

Total Cost/kwh = $\frac{₱\ 939,500}{15,980,400}$ = 5.88 c./kwh

* 7000KW @ ₱600 / 10% contingency & overhead / 7% engineering.

7th Year Cost:

Capital Investnment	₱ 4,914,000
KWH	18,194,400
Fuel Consumption	0.505 lb/kwh = 1.65 c./kwh
Interest @ 3 1/2%	₱ 172,000
Depreciation @ 5%	245,700
Fuel @ 1.65 c/kwh	300,200
Oil @ 0.10 c/kwh	182,000
Operation & Maintenance @ 2%	98,300
TOTAL	₱ 998,200

Total Cost/KWH = $\frac{₱\ 998,200}{18,194,400}$ = 5.49 c/kwh

8th Year Cost:

Capital Investment	₱ 4,914,000
KWH	20,516,280
Fuel consumption	0.505 lb./kwh = 1.65 c./kwh
Interest @ 3 1/2%	₱ 172,000
Depreciation @ 5%	245,700
Fuel @ 1.65 c/kwh	338,500
Oil @ 0.10 c/kwh	205,200
Operation & Maintenance @ 2%	98,300
TOTAL	₱ 1,059,700

Total Cost/kwh = $\frac{₱\ 1,059,700}{20,516,280}$ = 5.16 c/kwh

9th Year Cost:

Capital Investment	₱ 4,914,000
KWH	22,968,960
Fuel consumption	0.505 lb/kwh = 1.65 c/kwh
Interest @ 3 1/2%	₱ 172,000
Depreciation @ 5%	245,700
Fuel @ 1.65 c/kwh	379,000
Oil @ 0.10 c/kwh	229,700
Operation & Maintenance @ 2%	98,300
TOTAL	₱ 1,124,700

Total Cost/KWH = $\frac{₱\ 1,124,700}{22,968,960}$ = 4.91 c/kwh

10th Year Cost:

Capital Investment	₱ 4,914,000	
KWH	25,858,560	
Fuel consumption	0.505 lb/kwh	= 1.65 c/kwh
Interest @ 3 1/2%	₱ 172,000	
Depreciation @ 5%	245,700	
Fuel @ 1.65 c/kwh	426,700	
Oil @ 0.10 c/kwh	258,600	
Operation & Maintenance @ 2%	98,300	
TOTAL	₱ 1,201,300	

$$\text{Total KWH Cost} = \frac{₱\ 1,201,300}{25,858,560} = 4.65 \text{ c/kwh}$$

100

SECTION 8

RATE SCHEDULES AND REVENUES

RATE SCHEDULES AND REVENUES

SECTION 8

TABLE OF CONTENTS

RATE SCHEDULES

A. Description:

Rate schedules are set for two main purposes. First, they must generate the necessary revenues to provide for debt service, operating costs, maintenance and prudent reserves. They must also contain an element of promotion so that consumers will be encouraged to make a full and expanding use of the power supplies. If rate schedules are too low or lack the proper balance, revenues will be too low to support the system costs. If rate schedules are too high the usage will be depressed, and efficient use will not be made of the facilities. It is probable also that total revenues will still be inadequate due to the low consumption rates.

Rate making is an art. In the present circumstances we lack data on rural electric system operation in the Philippines, and hence have relied mainly on personal judgment. We have no doubt that existing rates are too high to encourage use by most consumers, and offer no incentives to an increased use of electric power in rural industries, farms and community endeavors.

The existing and proposed rates are shown in the section which follows. A summary sheet gives a comparison of average kwh costs at different consumption levels, for both old and new rates. Assuming that construction costs and consumption rates for the system develop reasonably close to our estimates, the revenues generated under the proposed rate schedules will be adequate to amortize the loan, pay operating expenses and establish prudent reserves. In fact, it may well be that within ten years the Board of Directors may have reason to consider a downward revision of rates to reduce unnecessary margins. Time and experience will make many refinements possible. We believe that the proposed rates combine the necessary elements of revenue production and promotion, and are reasonable for initial system operation.

The system will not break-even until the fourth or fifth year of operation. Losses during the initial years must be expected and accepted to allow for growth and development. A deferment of principal repayment, for the first five years, will provide adequate cash being available for interest, operation and maintenance.

The domestic rate schedule is intended to apply to the landowners' houses, overseers' houses, and the houses of the farm workers. A minimum bill of ₱5.00 is established, for which 20 kwh are provided. This minimum is necessary in order to provide a floor to revenue to ensure that minimum necessary income will be provided regardless of consumption. The energy rate is blocked to provide incentive for increased usage. The decreasing cost as additional blocks of energy are used, provides lower average kwh costs as consumption increases.

It is proposed that schools and churches should also be billed under this domestic rate schedule as this represents the lowest rate available, and hence appropriate to these community interests.

A commercial rate schedule is proposed similar in structure to the domestic schedule but designed to give slightly higher revenue per average kwh. This reflects the higher investment per consumer usually necessary for commercial services as compared to domestic. It also takes note of the different characteristics of the service and its relationship to the system as a whole. This rate too is blocked to provide the incentive for increased consumption. A demand charge is added to energy costs where demand is 20 kw or higher. Service contracts should also be required for loads above 20 kw and minimum billing tied to the contract demand.

The irrigation rate schedule has been written to provide the service but with protection to the Cooperative against potential unreasonable plant investment costs. Much of the initial system construction will be single-phase line. Irrigation pump requirements will generally be for three-phase service. We therefore recommend this schedule which requires the consumer to pay the cost of additional facilities necessary to provide the required service, or to arrange for these facilities through negotiation. We believe that irrigation pumping is an essential factor in helping develop the agricultural economy. To promote its use we propose an energy rate of 8c/kwh provided use is limited to certain designated off-peak hours each day. If the pumps are operated on-peak they should be billed at the commercial rate. This off-peak operation should be reasonable for the type of farming in the area.

Schedule III, the General Power Rate, should be retained for services now under contract. In the future this rate should be reserved for sales for resale, and other commercial loads served under Schedule B.

A security light program is also proposed. These lights will be a mercury-vapour lamp of 7000 lumen quality. Each will be controlled by an individual photo-electric cell for operation from dusk to dawn. The Cooperative will install and maintain the light and provide the electricity under the proposal. The light will provide security and convenience at farms, haciendas, businesses, schools, barrio areas, road junctions and other desired locations.

Revenue per kwh for each class of consumer has been extended through the number of consumers and their average consumption as developed in other sections of the report. Gross monthly and annual revenues are computed year by year for the ten-year period covered by the report. These data are given in subsection E. It can be noted that annual revenues climb from ₱840, 200 in the first full year of operation to ₱2, 961, 600 in the tenth year. The average selling price per kwh falls from 14. 8¢ in the first year to 12. 83¢ in the tenth.

Existing Schedule to be Cancelled
Replace with Schedule A

Schedule I - RESIDENTIAL METER RATES

Availability:

In the area covered by the distribution system of the Cooperative.

Applicability:

Residential customers for all domestic purposes. Where a customer conducts a business or industry in the same premises, this Schedule I will apply, provided that more than half of the total connected load are for residential and domestic purposes. Otherwise, said customer shall be billed under Schedule II, Commercial Rates or Schedule III, General Power Rates, whichever is applicable.

Character of Service:

220 volts, 60 cycles, single-phase.

Rates (Per Month):

For the first	15 KWH at ₱4.50
For the next	85 KWH at ₱0.25 per KWH
For the next	400 KWH at ₱0.20 per KWH
All over	500 KWH at ₱0.15 per KWH

NOTE: RATE SCHEDULE IN CASE NOS. 63-5143 AND 63-5144 ARE PROVISIONALLY APPROVED BY THE PUBLIC SERVICE COMMISSION.

Existing Schedule to be Cancelled

Schedule II - COMMERCIAL METER RATES

Availability:

In the area covered by the distribution system of the Cooperative.

Applicability:

Customers using the premises for business or commercial purposes; or in combined residence and place to conduct business where the connected load used for domestic purposes is less than half of the total.

Character of Service:

220 volts, 60 cycles, single-phase.

Rates (Per Month):

For the first	50 KWH at	₱0.30 per KWH
For the next	150 KWH at	₱0.25 per KWH
For the next	800 KWH at	₱0.20 per KWH
For all over	1,000 KWH at	₱0.15 per KWH

Minimum Charge:

₱6.00 per month for the first 2,000 watts connected load or less, plus ₱1.00 for each additional 500 watts connected load or less.

NOTE: RATE SCHEDULE IN CASE NOS. 63-5143 AND 63-5144 ARE PROVISIONALLY APPROVED BY THE PUBLIC SERVICE COMMISSION.

Existing Schedule to be Retained

Schedule III - GENERAL POWER RATES

Availability:

In the area covered by the distribution system of the Cooperative. Customers located in areas covered by the franchise holder of the town of Victorias are excluded. Also available to the franchise of Victorias.

Applicability:

Franchise holder of the town of Victorias and customers who guarantee a minimum monthly billing demand of 40 kilowatts.

Character of Service:

13,200 volts, 60 cycles, 3-phase.

Rates (Per Month):

Demand Charge: For each kilowatt of billing demand - ₱5.00 per KW per month.

Energy Charge: ₱0.075 per KWH.

Minimum Monthly Bill:

To be based on the billing demand but not less than ₱300.00 per month.

Note 1: Billing demand shall be determined by measurement using a maximum demand-meter with a 15-minute demand interval.

Note 2: Power Factor Adjustment Clause:
The energy charge of ₱0.75 per KWH is based on a power factor of 85% lagging which the customer agrees to maintain. If the customer's average monthly power factor vary from 85% lagging, the KWH metered during the month shall, for billing purposes, be multiplied by the following constants:

Existing Schedule to be Retained

Schedule III - GENERAL POWER RATES (continued)

Average Monthly Power Factor	Constant
1.00	0.960
0.95	0.970
0.90	0.980
0.85	1.000
0.80	1.025
0.75	1.050
0.70	1.075
0.65	1.100
0.60	1.150
0.55	1.200
0.50	1.250

For Power Factors between any two steps above, use the constant corresponding to the higher power factor.

NOTE: RATE SCHEDULE IN CASE NOS. 63-5143 AND 63-5144 ARE PROVISIONALLY APPROVED BY THE PUBLIC SERVICE COMMISSION.

Existing Schedule to be Cancelled

Schedule IV - RURAL RATES

Availability:

In the areas covered by the Cooperative's franchise for use in residences and farms. Customers in areas covered by the franchise holder of the town of Victorias are excluded.

Applicability:

For customers in the farms covered by the Cooperative's distribution system and outside the franchise area of the franchise holder of the town of Victorias.

Character of Service:

1. For customers with guaranteed consumption of less than 1000 KWH per month, 220 volts, 60 cycles, single-phase.

2. For customers with guaranteed consumption of not less than 1000 KWH per month, 220 volts, 60 cycles, 3-phase.

Rates (Per Month):

For the first 500 KWH at ₱0.20 per KWH
For the next 500 KWH at ₱0.15 per KWH
For all over 1000 KWH at ₱0.10 per KWH

Minimum Monthly Bill:

For customers not guaranteeing a consumption of 1000 KWH per month ---------- ₱ 75.00

For customers guaranteeing a minimum monthly consumption of 1000 KWH ---------- ₱ 142.50

NOTE: RATE SCHEDULE IN CASE NOS. 63-5143 AND 63-5144 ARE PROVISIONALLY APPROVED BY THE PUBLIC SERVICE COMMISSION

New Rate Schedule
Replaces Existing Schedule I

Schedule A - RESIDENTIAL METER RATES

Availability:

In the area covered by the distribution system of the Cooperative.

Applicability:

Residential customers for all domestic purposes, and/or small churches or schools. Where a customer conducts a business or industry in the same premises, this Schedule A will apply, provided that more than half of the total connected load are for residential and domestic purposes. Otherwise, said customer shall be billed under Schedule B, Commercial Rate or Schedule C, General Power Rates, whichever is applicable.

Character of Service:

Single-phase, 60 cycles, at available secondary voltage.

Rates (Per Month):

For the first	20 KWH at	₱5.00
For the next	30 KWH at	₱0.20 per KWH
For the next	50 KWH at	₱0.16 per KWH
For the next	200 KWH at	₱0.13 per KWH
For the next	700 KWH at	₱0.10 per KWH
All over	1000 KWH at	₱0.80 per KWH

Minimum Per Month - ₱5.00

New Rate Schedule
Replaces Existing Schedule II

Schedule B - COMMERCIAL METER RATES

Availability:

In the area covered by the distribution system of the Cooperative.

Applicability:

Commercial customers using the premises for business purposes. Where a customer resides in the same premises, this Schedule B will apply, provided that more than half the total connected load is for commercial purposes.

Character of Service:

Single-phase or three-phase, 60 cycles, at available secondary voltages.

Monthly Energy Charge:

For the first	40 KWH	at ₱10.00
For the next	60 KWH	at ₱0.20 per KWH
For the next	300 KWH	at ₱0.16 per KWH
For the next	600 KWH	at ₱0.13 per KWH
All over	1000 KWH	at ₱0.10 per KWH

Monthly Demand Charge:

First 20 KW, no demand charge
Next 230 KW, of billing demand at ₱5.00 per KW

Minimum per month - ₱10.00 or contract demand.

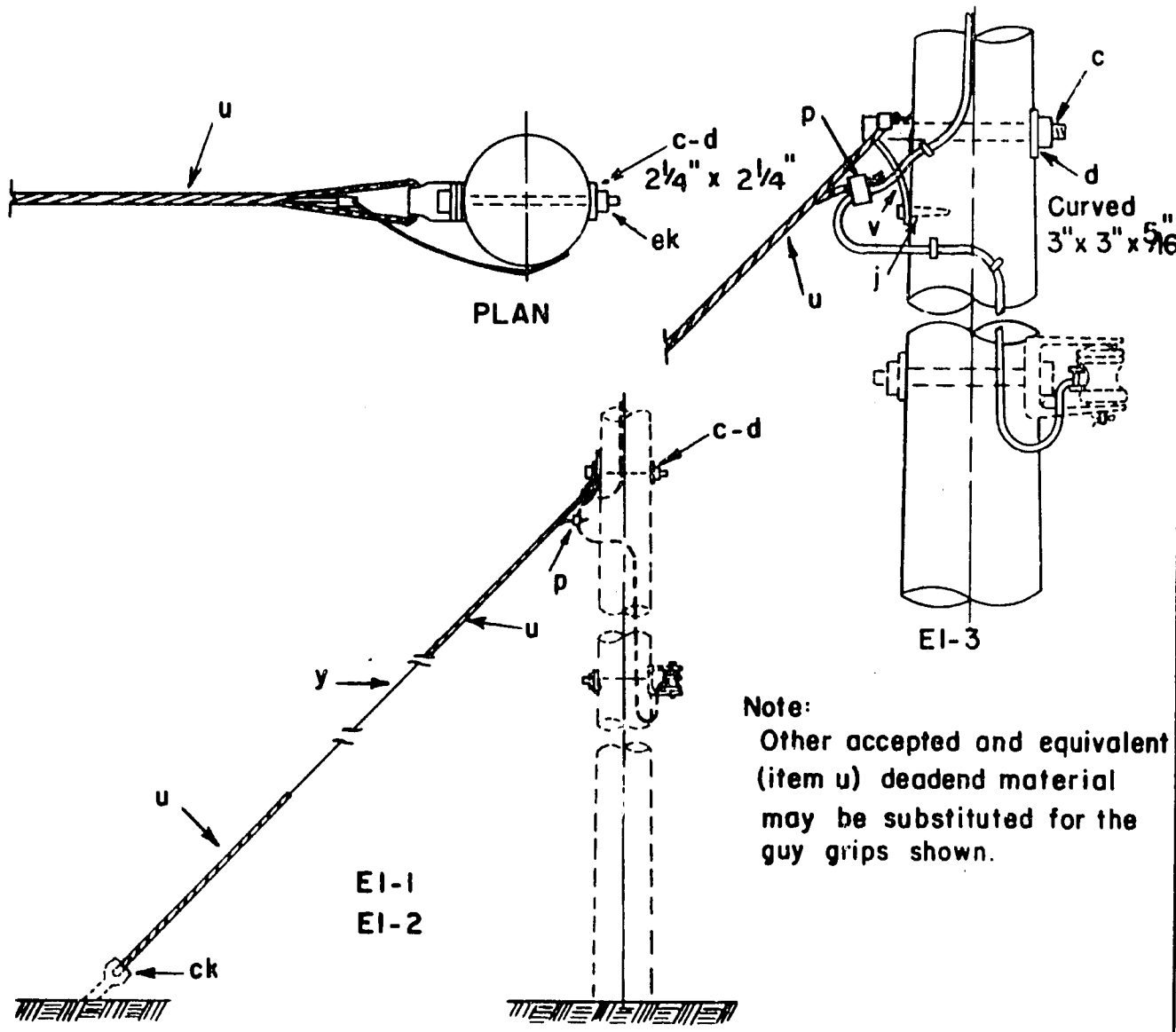
CONSTRUCTION STANDARD

DISTRIBUTION LINE

7.6/13.2 KV

E2-2 Single Overhead Guy, Through Bolt Type, 3/8" Guy Wire

Item	No.	Material	Unit Cost	Extended Cost
d	1	Washer, curved, 3" x 3" x 5/16 14/16" hole	0.57	0.57
u	2 heavy duty	Deadend for guy strand	6.00	12.00
y	req'd. length	Guy Wire, S. M., 7-strand	0.30/ft	45.00
ab	1	Nut, thimble type eye, 5/8"	2.40	2.40
ao	1	Bolt, Thimble eye, 5/8" x req'd. length	4.00	4.00
aq	1	Jumper, #6 S.D or equiv.	0.24	0.24
p	2	Connectors, as req'd	0.90	1.80
ek	2	Locknuts	0.03	0.06
		TOTAL		₱ 66.07



Note:
Other accepted and equivalent (item u) deadend material may be substituted for the guy grips shown.

See guide drawings M30-1 and M30-2

ITEM	MATERIAL	ASSEMBLY UNIT E1-1 1/4" Guy Wire No. REQ'D	E1-2 3/8" Guy Wire No. REQ'D	E1-3 7/16" Guy Wire No. REQ'D
c	Bolt, machine, 5/8" x req'd length	1	1	1
d	Washer, 2¼" x 2¼" x 3/16", 13/16" hole	1	1	
d	Washer, curved, 3" x 3" x 5/16", 11/16" hole			1
j	Screw, lag, 1/2" x 4"			1
p	Connectors, as required			
u	Deadend for guy strand	2	2	2
v	Guy attachment	1	1	1-Heavy Duty
y	Guy Wire, S.M., 7-Strand	req'd length	req'd length	req'd length
ck	Clamp, anchor rod bonding	1	1	1
aq	Jumper, #6 S.D. copper or equiv.	1	1	1
ek	Locknuts			

7.2/12.5 KV.
SINGLE DOWN GUY, THROUGH BOLT TYPE

CONSTRUCTION STANDARD

DISTRIBUTION LINE

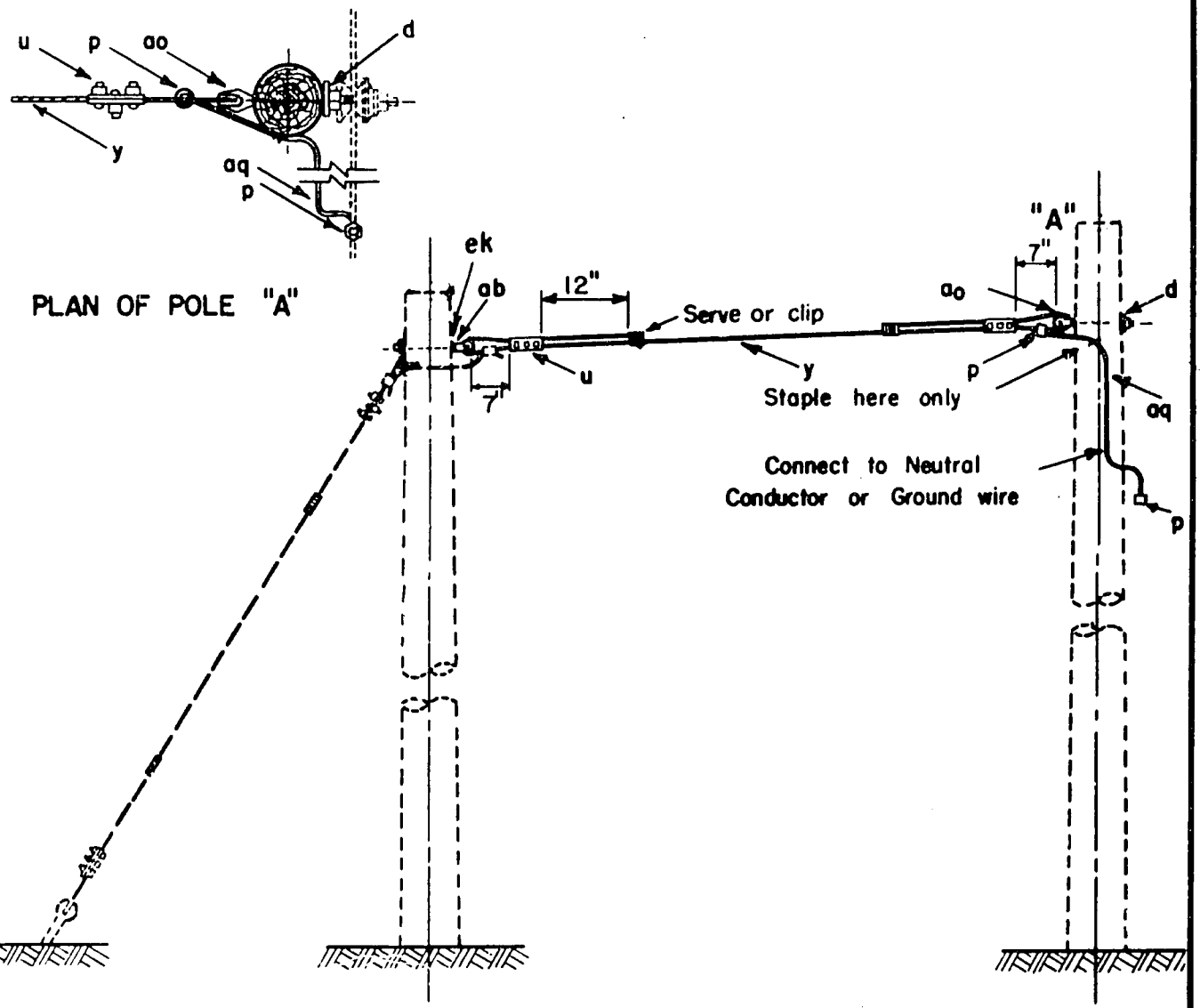
7.6/13.2 KV

E3-2 Single Down Guy, Wrapped Type, 3/8" Guy Wire

Item	No.	Material	Unit Cost	Extended Cost
c	1	Bolt, machine, 5/8" x req'd length	1.15	1.15
p	2	Connectors, as required	0.90	1.80
u	2 medium duty	Clamp, guy, 3-bolt, 6" long	9.80	19.60
y	required length	Guy wire, S.M., 7-strand	0.30	15.00
aq	6	Jumper, #6 S.D. copper or equiv.	0.24/ft	1.44
bj	2	Guy hook, J	0.84	1.68
bk	2	Guy plate, 4" x 8", 14" gauge	0.76	1.52
bp	8	Nail, 8 penny, galv.	0.02	0.16
ck	1	Clamp, anchor rod bonding	4.20	4.20
ek		Locknuts	0.03	0.06
		TOTAL		₱ 46.61

E3-10

at	1	Guy guard, 8' min. length	9.85	9.85
		TOTAL		₱ 9.85



Note:

Other accepted and equivalent items of deadend material may be substituted for the 3-bolt clamp shown.

ITEM	MATERIAL	ASSEMBLY UNIT E2-1 1/4" GUY WIRE No. REQ'D.	E2-2 3/8" GUY WIRE No. REQ'D.	E2-3 7/16" GUY WIRE No. REQ'D.
d	Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole	1		
d	Washer, curved, 3" x 3" x 5/16", 11/16" hole		1	1
u	Deadend for guy strand	2-Medium Duty	2-Heavy Duty	2-Heavy Duty
y	Guy wire, S.M., 7-strand	req'd. length	req'd. length	req'd. length
ab	Nut, thimble type eye, 5/8"	1	1	1
ao	Bolt, thimbleye, 5/8" x req'd. length	1	1	1
aq	Jumper, #6 S.D. or equivalent	1	1	1
p	Connectors, as req'd.			
ek	Locknuts			

7.2/12.5 KV

SINGLE OVERHEAD GUY, THROUGH BOLT TYPE

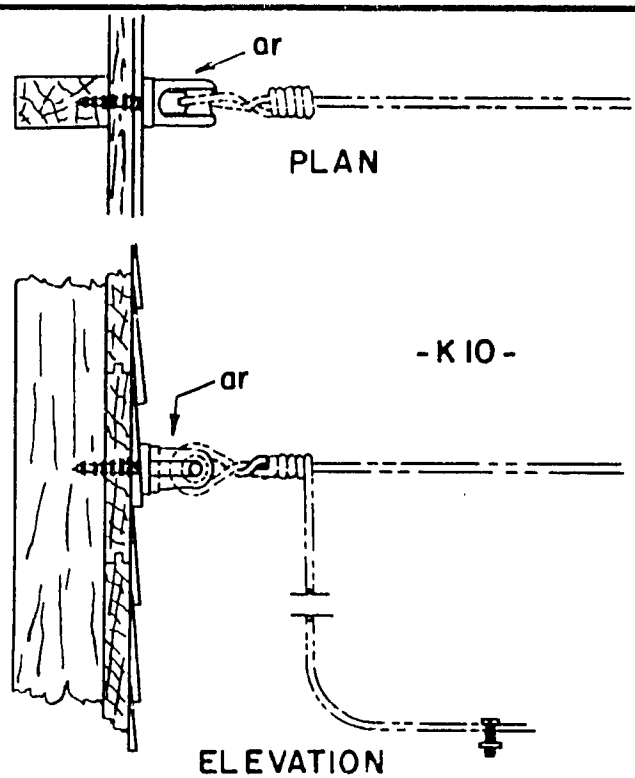
CONSTRUCTION STANDARD

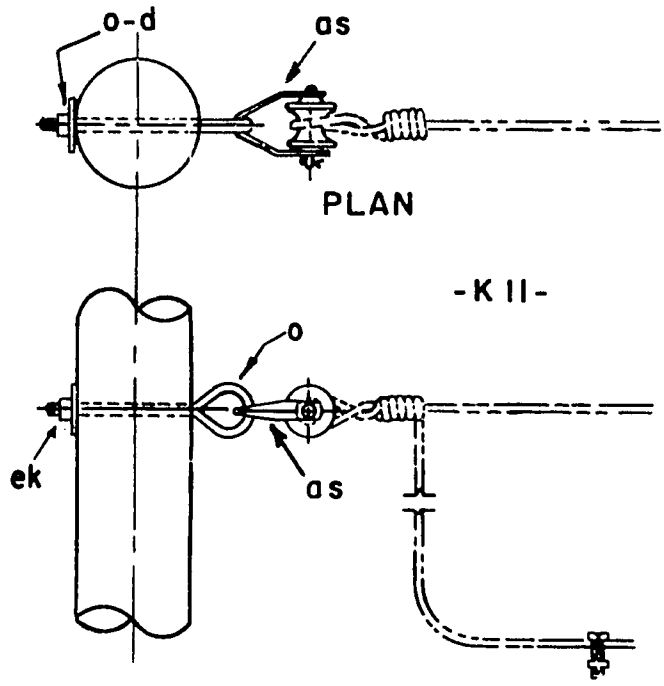
DISTRIBUTION LINE

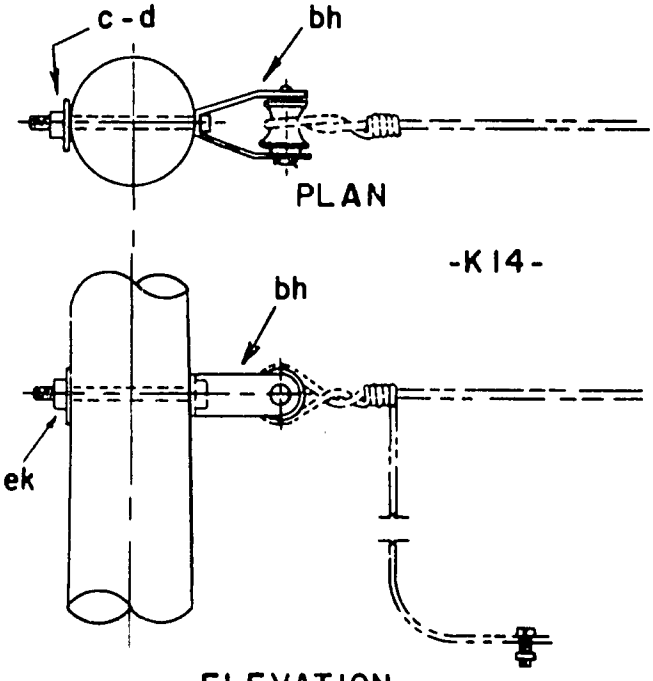
7.6/13.2 KV

M2-1 Grounding Assembly-Ground Rod Type

Item	No.	Material	Unit Cost	Extended Cost
p	2	Connector	0.90	1.80
ai	1	Rod, ground, 5/8" dia. Min.	10.00	10.00
aj	1	Clamp, ground rod	2.70	2.70
al	1	Ground wire clip	0.02	0.02
cj	1	Ground wire, #6 S.D. copper or equivalent	0.24/ft	12.00
		TOTAL		₱ 26.52







ITEM	NO.	MATERIAL		ITEM	NO.	MATERIAL	
c		Bolt, machine, 5/8" x req'd length		as		Clevis, service, swinging, insulated	
d		Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole		bh		Clevis, service, deadend, insulated	
o		Bolt, eye, 5/8" x req'd length		ek		Locknuts	
ar		Wire holder					

SERVICE ASSEMBLIES

CONSTRUCTION STANDARD

DISTRIBUTION LINE

7.6/13.2 KV

J-8 Secondary Assemblies

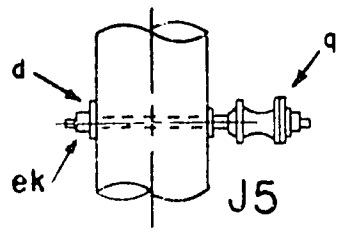
Item	No.	Material	Unit Cost	Extended Cost
d	1	Washer 2 1/4" x 2 1/4x3/16", 13/16" hole	0.24	0.24
bs	1	Bolt single upset insulated	3.25	3.25
ek		Locknuts	0.03	0.03
		TOTAL	₱	3.52

K-10 Service Assemblies

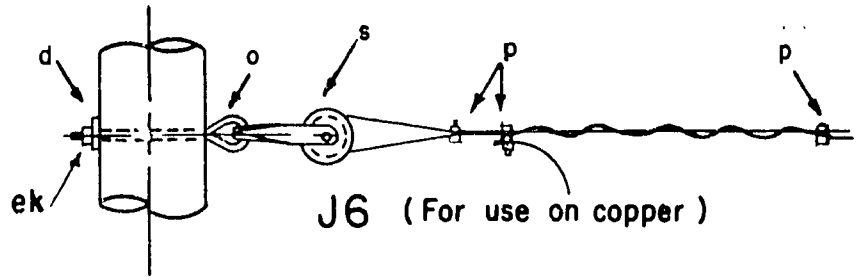
ar	1	Wireholder	0.35	0.35
		TOTAL	₱	0.35

K-11

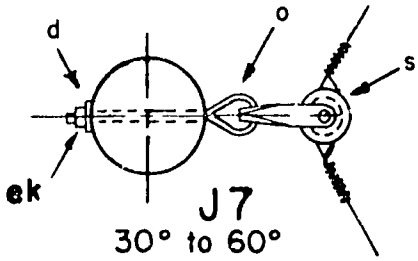
d	1	Washer 2 1/4" x 2 1/4" x 3/16", 13/16" hole	0.24
o	1	Bolt eye 5/8" x req'd length	1.80
as	1	Clevis service swinging insul'd.	1.50
ek		Locknuts	0.03
		TOTAL . . . . . ₱	3.57



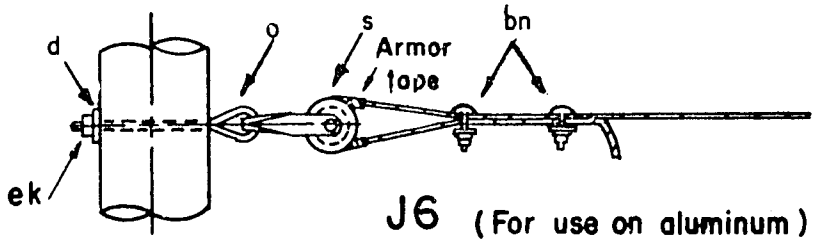
J5



J6 (For use on copper)



J7
30° to 60°



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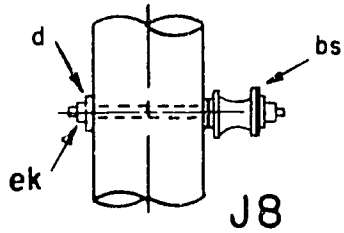

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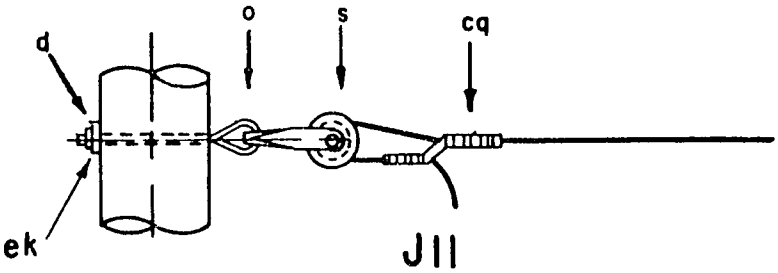
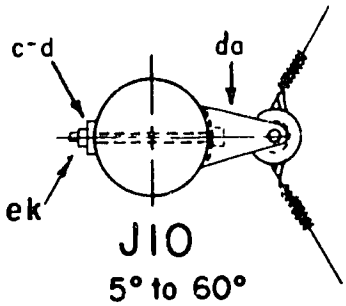
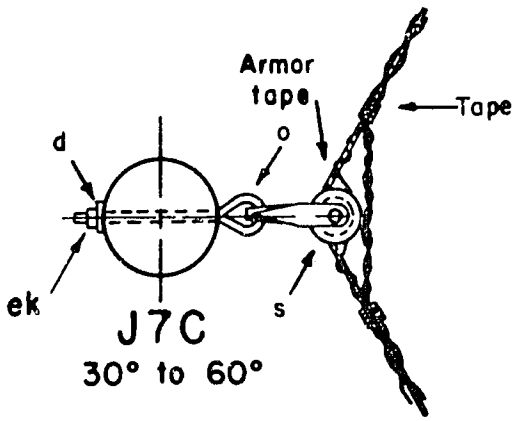


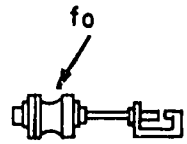
J11



J10
5° to 60°



J7C
30° to 60°



J12

For use on Self Supporting Service Cable

ITEM	NO.	MATERIAL			MATERIAL
c		Bolt, machine, 5/8" x required length	bs		Bolt, single upset insulated
d		Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole	bn		Clamp, loop, deadend
o		Bolt, eye, 5/8" x required length	cq		Sleeve, offset, splicing
p		Connectors, as required	da		Bracket, insulated
q		Bolt, double upset, insulated	fo		Transformer secondary bracket
s		Clevis, secondary, swinging, insulated	ek		Locknuts

SECONDARY ASSEMBLIES

CONSTRUCTION STANDARD

DISTRIBUTION LINE

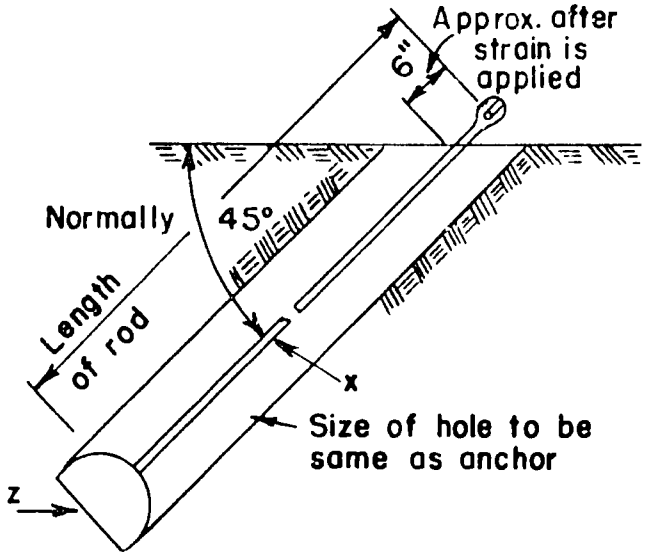
7.6/13.2 KV

J-5 Secondary Assemblies

Item	No.	Material	Unit Cost	Extended Cost
d	1	Washer, 2 1/4" x 2 1/4 x 3/16" 13/16" hole		0.24
q	1	Bolt double upset insulated		3.80
ek		Locknuts		0.30
		TOTAL	₱	4.07

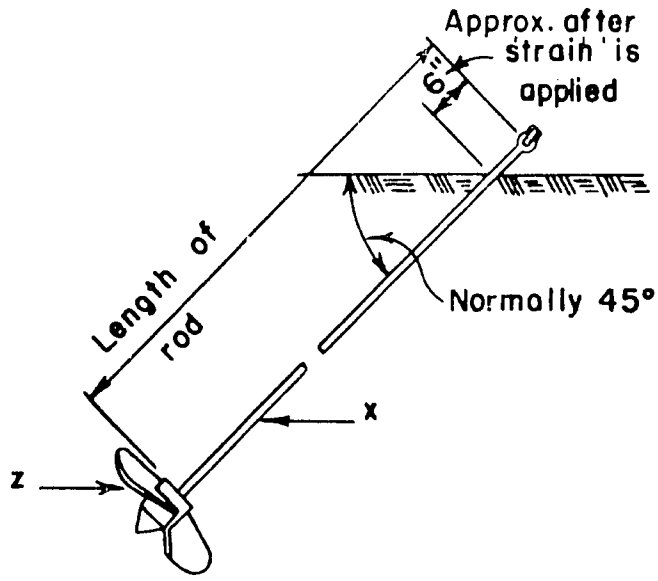
J-6

d	1	Washer 2 1/4" x 2 1/4" x 3/16" 13/16" hole		0.24
o	1	Bolt eye 5/8" x req'd length		1.80
s	1	Clevis secondary swinging insulated		1.20
bn		Clamp, loop deadend		0.90
ek		Locknuts armor tape		0.30
		TOTAL	₱	4.54



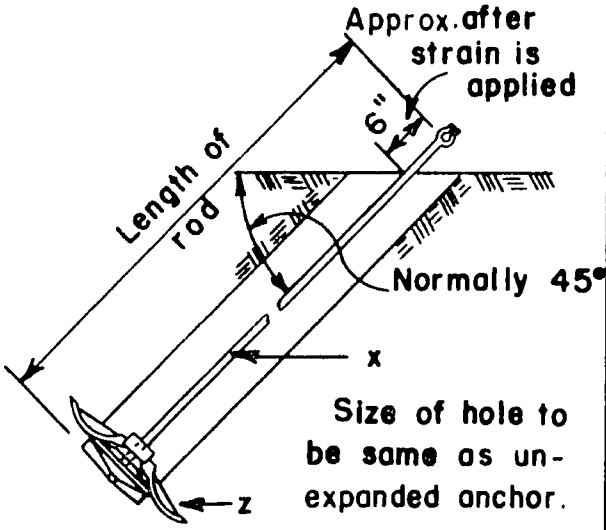
CONE

FI-1C, FI-2C, FI-3C,



SCREW

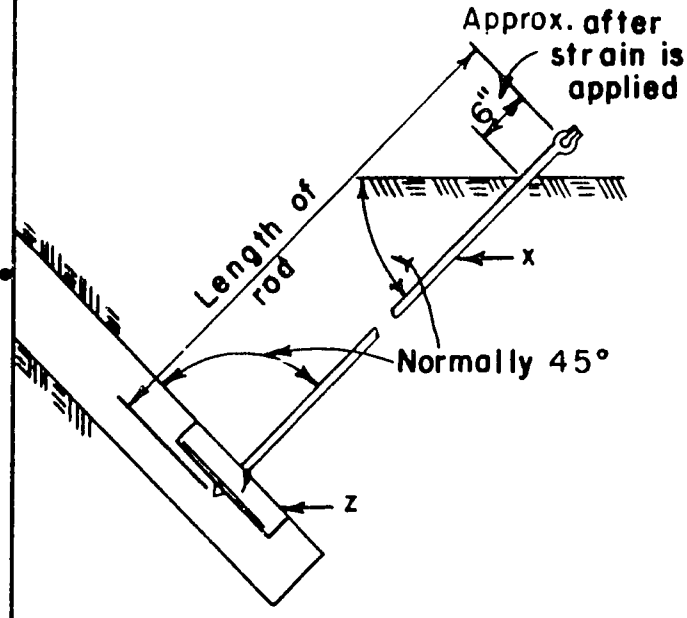
FI-1S, FI-2S, FI-3S, FI-4S



EXPANDING

FI-1, FI-2, FI-3, FI-4

Note: Projection of anchor rods above earth may be increased to a max. of 12" in cultivated fields or other locations where necessary to prevent burying of the rod eye.



PLATE

FI-1P, FI-2P, FI-3P, FI-4P

		ASSEMBLY UNIT							
		FI-1		FI-2		FI-3		FI-4	
Holding Power in Ordinary Soil (pounds)		6000		8000		10,000		12,000	
ITEM	MATERIAL	NO.		NO.		NO.		NO.	
x	Rod, anchor, thimble eye	1	5/8" x 7'-0"	1	5/8" x 7'-0"				
x	Rod, anchor, twin eye					1	3/4" x 8'-0"	1	3/4" x 8'-0"
z	Anchor ---------- type	1		1		1		1	

LINE ANCHOR ASSEMBLIES

CONSTRUCTION STANDARD

DISTRIBUTION LINE

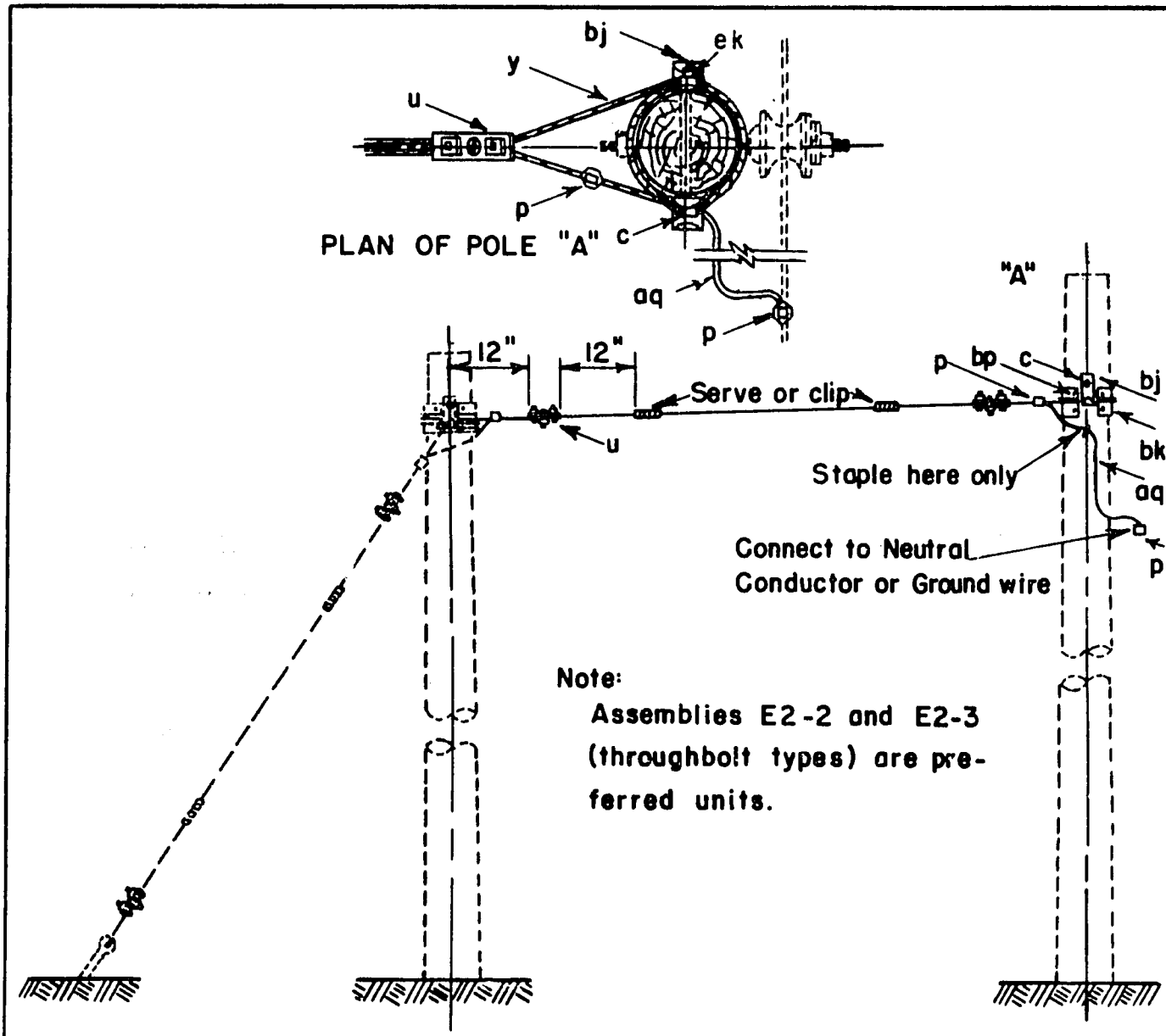
7.6/13.2 KV

F1-2 Line Anchor Assembly

Item	No.	Material	Unit Cost	Extended Cost
x	1	Rod, anchor, thimble eye 5/8" x 7' 0"	5.80	5.80
z	1	Anchor expanding 8MLB	8.65	8.65
		TOTAL		₱ 14.45

F1-3 Line Anchor Assembly

x	1	Rod anchor Twin eye, 5/8"x7'-0"	6.00	6.00
z	1	Anchor expanding 8MLB	8.65	8.65
		TOTAL		₱ 14.65



Note:
Assemblies E2-2 and E2-3 (throughbolt types) are preferred units.

		ASSEMBLY UNIT	
		E4-2 3/8" Guy Wire	E4-3 7/16" Guy Wire
ITEM	MATERIAL	No. REQ'D	No. REQ'D
c	Bolt, machine, 5/8" x req'd length	1	1
p	Connectors, as req'd		
u	Deadend for guy strond	2-Medium Duty	2-Heavy Duty
y	Guy Wire, S-M, 7-strond	req'd length	req'd length
aq	Jumper, #6 S.D. or equivolent	1	1
bj	Guy Hook, J	2	2
bk	Guy Plate, 4"x 8", 14 gauge	2	2
bp	Nail, 8 penny, galv.	8	8
ek	Locknuts		

7.2 /12.5 KV.
SINGLE OVERHEAD GUY, WRAPPED TYPE

D. Comparison Between Existing and Proposed Rates/KWH

RESIDENTIAL SERVICE

KWH/MONTH	EXISTING SCHEDULE		PROPOSED SCHEDULE	
	Total Bill	Ave. Cost/KWH	Total Bill	Ave. Cost/KW
15	₱ 4.50	₱ 0.300	₱ 5.00	₱ 0.33
20	5.75	0.288	5.00	0.25
25	7.00	0.28	6.00	0.24
30	8.25	0.275	7.00	0.233
35	9.50	0.271	8.00	0.228
40	10.75	0.269	9.00	0.225
45	12.00	0.267	10.00	0.222
50	13.25	0.265	11.00	0.22
55	14.50	0.264	11.80	0.215
60	15.75	0.263	12.60	0.21
65	17.00	0.262	13.40	0.206
70	18.25	0.261	14.20	0.203
75	19.50	0.26	15.00	0.20
80	20.75	0.259	15.80	0.198
85	22.00	0.259	16.60	0.195
90	23.25	0.258	17.40	0.193
95	24.50	0.258	18.20	0.192
100	25.75	0.258	19.00	0.19
105	26.75	0.255	19.65	0.187
110	27.75	0.252	20.30	0.185
115	28.75	0.25	20.95	0.182
120	29.75	0.248	21.60	0.18
125	30.75	0.246	22.25	0.178
130	31.75	0.244	22.90	0.176
135	32.75	0.243	23.55	0.174
140	33.75	0.241	24.20	0.172
145	34.75	0.24	24.85	0.171
350	75.75	0.216	50.00	0.143
390	83.75	0.215	54.00	0.138
440	93.75	0.213	59.00	0.134
490	103.75	0.212	64.00	0.131
550	113.25	0.206	70.00	0.127
580	117.75	0.203	73.00	0.126
610	122.25	0.20	76.00	0.125

Residential Service - Continuation

640	126.75	0.198	79.00	0.123
670	131.25	0.196	82.00	0.122
700	135.75	0.194	85.00	0.121
1100	195.75	0.178	123.00	0.112
1190	209.25	0.176	130.20	0.109
1290	224.25	0.174	138.20	0.107
1400	240.75	0.172	147.00	0.105
1500	255.75	0.171	155.00	0.103
1630	275.25	0.169	165.40	0.101
1760	294.75	0.167	175.80	0.10
1900	315.75	0.166	187.00	0.099
2050	338.25	0.165	199.00	0.097
2210	362.25	0.164	211.80	0.096

COMMERCIAL SERVICE

KWH/MONTH	EXISTING SCHEDULE		PROPOSED SCHEDULE	
	Total Bill	Ave. Cost/KWH	Total Bill	Ave. Cost/KWH
100	₱ 25.75	₱ 0.258	₱ 22.00	₱ 0.22
105	26.75	0.255	22.80	0.217
110	27.75	0.252	23.60	0.215
115	28.75	0.25	24.40	0.212
120	29.75	0.248	25.20	0.21
125	30.75	0.246	26.00	0.208
130	31.75	0.244	26.80	0.206
135	32.75	0.243	27.60	0.204
140	33.75	0.241	28.40	0.203
145	34.75	0.24	29.20	0.201
150	35.75	0.238	30.00	0.20
155	36.75	0.237	30.80	0.199
160	37.75	0.236	31.60	0.198
165	38.75	0.235	32.40	0.196
170	39.75	0.234	33.20	0.195
175	40.75	0.233	34.00	0.194
180	41.75	0.232	34.80	0.193
185	42.75	0.231	35.60	0.192
190	43.75	0.230	36.40	0.191
195	44.75	0.229	37.20	0.191
200	45.75	0.229	38.00	0.19
205	46.75	0.228	38.80	0.189
210	47.75	0.227	39.60	0.189
215	48.75	0.227	40.40	0.188
220	49.75	0.226	41.20	0.187
225	50.70	0.226	42.00	0.187

SECTION 9

WIRING PROGRAM

WIRING PROGRAM

SECTION 9

TABLE OF CONTENTS

E. DETERMINATION OF OPERATING REVENUE

	YEAR 1	2	3	4	5	6	7	8	9	10
OVERSEER HOUSE										
A. Average Mo. kwh Per Consumer	350	390	440	490	550	580	610	640	670	700
B. Charge as per Rate Schedule/kwh	14.3¢	13.8¢	13.4¢	13.1¢	12.7¢	12.6¢	12.5¢	12.3¢	12.2¢	12.1¢
C. Average Monthly Revenue/Cons.	₱ 50.00	₱ 54.00	₱ 59.00	₱ 64.00	₱ 70.00	₱ 73.00	₱ 76.00	₱ 79.00	₱ 82.00	₱ 85.00
D. Average Number of Consumers	196	216	236	255	275	320	365	410	455	500
E. Average Monthly Revenue	₱ 9,800	₱ 11.664	₱ 13.924	₱ 16.320	₱ 19,250	₱ 23,360	₱ 27,740	₱ 32,390	₱ 37,310	₱ 42,500
F. Annual Revenue	₱117,600	₱139,968	₱167,088	₱195,840	₱231,000	₱280,320	₱332,880	₱388,680	₱447,720	₱510,000
PLANTER-OWNED										
A. Average Mo. kwh Per Consumer	1100	1190	1290	1400	1500	1630	1760	1900	2050	2210
B. Charge as per Rate Schedule/kwh	11.2¢	10.9¢	10.7¢	10.5¢	10.3¢	10.1¢	10.0¢	9.9¢	9.7¢	9.6¢
C. Average Monthly Revenue/Cons.	₱ 123.00	₱ 130.20	₱ 138.20	₱ 147.00	₱ 155.00	₱ 165.40	₱ 175.80	₱ 187.00	₱ 199.00	₱ 211.80
D. Average Number of Consumers	64	74	84	94	104	114	124	134	144	154
E. Average Monthly Revenue	₱ 7,872	₱ 9,634	₱ 11.608	₱ 13,818	₱ 16,120	₱ 18,855	₱ 21,799	₱ 25,058	₱ 28,656	₱ 32 617
F. Annual Revenue	₱ 94.464	₱115.617	₱139.305	₱165.816	₱193.440	₱226 267	₱261 590	₱300,696	₱343.872	₱391.406
WORKER										
A. Average Mo. kwh Per Consumer	20	25	30	35	40	45	50	55	60	65
B. Charge as per Rate Schedule/kwh	25¢	24¢	23.3¢	22.8¢	22.5¢	22.2¢	22.0¢	21.5¢	21.0¢	20.8¢
C. Average Monthly Revenue/Cons.	₱ 5.00	₱ 6.00	₱ 7.00	₱ 8.00	₱ 9.00	₱ 10.00	₱ 11.00	₱ 11.80	₱ 12.60	₱ 13.40
D. Average Number of Consumers	6350	6475	6600	6735	6870	7000	7150	7290	7435	7585
E. Average Monthly Revenue	₱ 31,750	₱ 38,850	₱ 46,200	₱ 53,880	₱ 62,010	₱ 70,000	₱ 78,650	₱ 86,022	₱ 93,681	₱101,639
F. Annual Revenue	₱381,000	₱466.200	₱554,400	₱646.560	₱744,120	₱840.000	₱943,800	₱1,032,264	₱1,124,172	₱1,219,668
SMALL COMMERCIAL										
A. Average Mo. kwh Per Consumer	125	135	145	155	165	175	185	195	205	215
B. Charge as per Rate Schedule/kwh	20.8¢	20.4¢	20.1¢	19.9¢	19.6¢	19.4¢	19.2¢	19.0¢	18.9¢	18.7¢
C. Average Monthly Revenue/Cons.	₱ 26.00	₱ 27.60	₱ 29.20	₱ 30.80	₱ 32.40	₱ 34.00	₱ 35.60	₱ 37.20	₱ 38.80	₱ 40.40
D. Average Number of Consumers	50	52	54	56	58	61	64	67	70	73
E. Average Monthly Revenue	₱ 1.300	₱ 1.435	₱ 1.576	₱ 1.724	₱ 1.879	₱ 2.074	₱ 2.278	₱ 2.492	₱ 2.716	₱ 2.949
F. Annual Revenue	₱ 15.600	₱ 17 222	₱ 18.921	₱ 20,697	₱ 22,550	₱ 24,888	₱ 27.340	₱ 29,908	₱ 32.592	₱ 35 390
SCHOOL AND CHURCHES										
A. Average Mo. kwh Per Consumer	100	105	110	115	120	125	130	135	140	145
B. Charge as per Rate Schedule/kwh	19.0¢	18.7¢	18.5¢	18.2¢	18.0¢	17.8¢	17.6¢	17.4¢	17.2¢	17.1¢
C. Average Monthly Revenue/Cons.	₱ 19.00	₱ 19.65	₱ 20.30	₱ 20.95	₱ 21.60	₱ 22.25	₱ 22.90	₱ 23.55	₱ 24.20	₱ 24.85
D. Average Number of Consumers	30	31	32	33	34	35	36	37	38	39
E. Average Monthly Revenue	₱ 570.00	₱ 609.15	₱ 649.60	₱ 691.35	₱ 734.40	₱ 778.75	₱ 824.40	₱ 871.35	₱ 919.60	₱ 969.15
F. Annual Revenue	₱ 6,840	₱ 7,309	₱ 7,795	₱ 8,296	₱ 8,812	₱ 9,345	₱ 9,892	₱ 10,456	₱ 11,035	₱ 11,629
IRRIGATION										
A. Average Mo. kwh Per Consumer	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500
B. Charge as per Rate Schedule/kwh	8¢	8¢	8¢	8¢	8¢	8¢	8¢	8¢	8¢	8¢
C. Average Monthly Revenue/Cons.	₱ 200	₱ 200	₱ 200	₱ 200	₱ 200	₱ 200	₱ 200	₱ 200	₱ 200	₱ 200
D. Average Number of Consumers	10	12	14	16	18	21	25	29	34	40
E. Average Monthly Revenue	₱ 2,000	₱ 2,400	₱ 2,800	₱ 3,200	₱ 3,600	₱ 4,200	₱ 5,000	₱ 5,800	₱ 6,800	₱ 8,000
F. Annual Revenue	₱ 24,000	₱ 28,800	₱ 33,600	₱ 38,400	₱ 43,200	₱ 50,400	₱ 60,000	₱ 69,000	₱ 81,600	₱ 96,000

	YEAR									
LARGE POWER	1	2	3	4	5	6	7	8	9	10
A. Average Mo. kwh Per Consumer	20000	21000	22000	23000	24000	25000	25000	25000	25000	25000
B. Charge as per Rate Schedule/kwh	9.9¢	9.8¢	9.7¢	9.6¢	9.5¢	9.4¢	9.4¢	9.4¢	9.4¢	9.4¢
C. Average Monthly Revenue/Cons.	P 1,990	P 2,065	P 2,140	P 2,215	P 2,290	P 2,365	P 2,365	P 2,365	P 2,365	P 2,365
D. Average Number of Consumers	3	4	5	6	7	8	9	10	11	12
E. Average Monthly Revenue	P 5,970	P 8,260	P 10,700	P 13,290	P 16,030	P 18,920	P 21,285	P 23,650	P 26,015	P 28,380
F. Annual Revenue	P 71,640	P 99,120	P128,400	P159,480	P192,360	P227,040	P255,420	P283,800	P312,180	P340,560
OTHER UTILITIES										
Total KWH Per Month (3)	111,000	124,500	139,500	156,000	174,000	195,000	219,000	243,000	273,000	306,000
A. Average Mo. kwh/cons.	37,000	41,500	46,500	52,000	58,000	65,000	73,000	81,000	91,000	102,000
B. Charge as per Rate Schedule/kwh	9.42¢	9.31¢	9.22¢	9.17¢	9.09¢	9.00¢	8.95¢	8.91¢	8.81¢	8.74¢
C. Average Monthly Revenue/Cons.	P 3,485	P 3,863	P 4,287	P 4,768	P 5,272	P 5,850	P 6,533	P 7,217	P 8,017	P 8,914
D. Average Number of Consumers	3	3	3	3	3	3	3	3	3	3
E. Average Monthly Revenue	P 10,456	P 11,590	P 12,861	P 14,305	P 15,816	P 17,550	P 19,600	P 21,651	P 24,051	P 26,744
F. Annual Revenue	P125,474	P139,091	P154,342	P171,662	P189,799	P210,600	P235,206	P259,815	P288,615	P320,932
SECURITY LIGHTS										
A. Average Mo. kwh Per Consumer	50	50	50	50	50	50	50	50	50	50
B. Charge as per Rate Schedule/kwh	24¢	24¢	24¢	24¢	24¢	24¢	24¢	24¢	24¢	24¢
C. Average Monthly Revenue/Cons.	P 12.00	P 12.00	P 12.00	P 12.00	P 12.00	P 12.00	P 12.00	P 12.00	P 12.00	P 12.00
D. Average Number of Consumers	25	50	75	100	125	150	175	200	225	250
E. Average Monthly Revenue	P 300	P 600	P 900	P 1,200	P 1,500	P 1,800	P 2,100	P 2,400	P 2,700	P 3 000
F. Annual Revenue	P 3,600	P 7,200	P 10,800	P 14,400	P 18,000	P 21,600	P 25,200	P 28,800	P 32,400	P 36,000

SUMMARY

ANNUAL REVENUE										
OVERSEER HOUSE	P 117,600	P 139,968	P 167,088	P 195,840	P 231,000	P 280,320	P 332,880	P 388,680	P 447,720	P 510,000
PLANTER-OWNED	94,464	115,617	139,305	165,816	193,440	236,267	281,590	300,896	343,872	391,466
WORKERS	381,000	466,200	554,400	646,560	744,120	840,000	943,800	1,032,264	1,134,172	1,219,068
SMALL COMMERCIAL	15,600	17,222	18,921	20,697	22,550	24,888	27,340	29,906	32,892	35,890
SCHOOL AND CHURCHES	6,840	7,309	7,795	8,296	8,812	9,345	9,892	10,456	11,036	11,630
IRRIGATION	24,000	28,800	33,600	38,400	43,200	50,400	60,000	69,000	81,600	96,000
LARGE POWER	71,640	99,120	128,400	159,480	192,360	227,040	255,420	283,800	312,180	340,560
OTHER UTILITIES	125,474	139,091	154,342	171,662	189,799	210,600	235,206	259,815	288,615	320,932
SECURITY LIGHTS	3,600	7,200	10,800	14,400	18,000	21,600	25,200	28,800	32,400	36,000
TOTAL REVENUE	P 340,218	P1,020,529	P1,214,653	P 1,421,152	P 1,640,282	P 1,890,460	P 2,151,330	P 2,403,420	P 2,674,186	P 2,961,587
TOTAL KWH SOLD	5,176,000	7,332,000	8,526,000	10,140,000	12,552,000	13,896,000	15,960,000	18,186,000	20,508,000	22,983,000
AVERAGE REVENUE/KWH SOLD	14.30¢	14.32¢	14.25¢	14.01¢	13.24¢	13.60¢	13.48¢	13.24¢	13.04¢	12.89¢

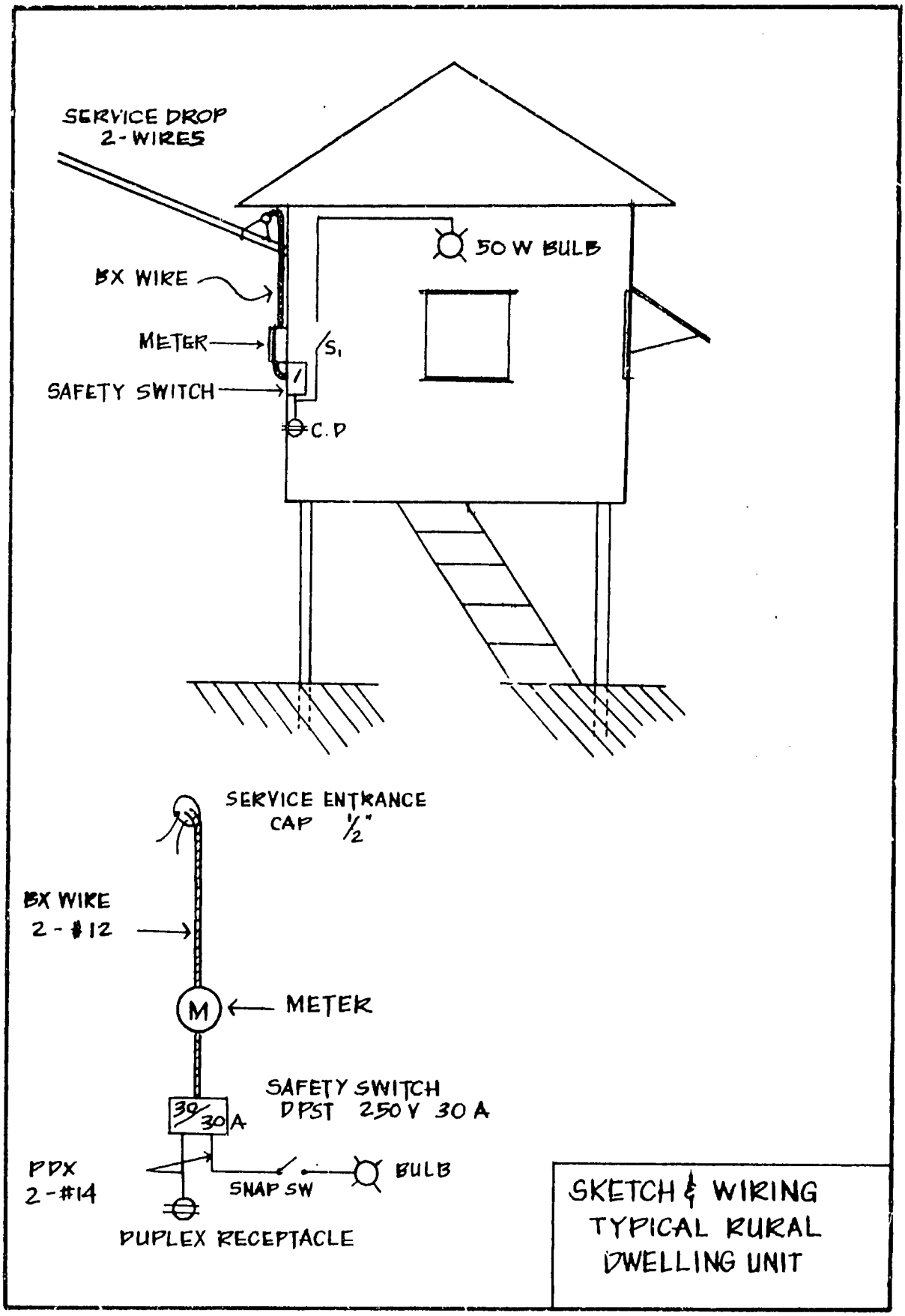
B. Bill of Materials:

WIRING PLAN FOR RURAL DWELLING

BILL OF MATERIALS

3 meters	BX wire 2 - #12 @ ₱1.80 per meter	-	₱ 5.40
10 meters	PDX wire 2 - #14 (loomex) @ ₱0.90/m	-	9.00
1 piece	Service entrance cap 1/2" @ ₱1.60	-	1.60
4 pieces	BX connector 1/2" @ ₱0.30 each	-	1.20
1 piece	Safety switch 30A 250V DPST @ ₱9.00	-	9.00
1 piece	Duplex receptacle @ ₱1.40 each	-	1.40
1 piece	Snap switch SPST 250V @ ₱1.60 each	-	1.60
1 piece	Wall socket porcelain @ ₱0.60 each	-	0.60
1 piece	Electric bulb 50W 230V @ ₱0.90 each	-	0.90
1 box*	Insulated staples 7/8" @ ₱1.00/box	-	1.00
1 roll	Plastic tape 3/4" @ ₱0.70 per roll	-	0.70
	Material Total	-	₱32.40
	Labor 2 man-days @ ₱7.00	-	14.00
	TOTAL		₱46.40
	USE	-	50.00

*100 pcs.



SKETCH & WIRING
TYPICAL RURAL
DWELLING UNIT

WIRING PROGRAM

A. Description

The majority of the Cooperative's consumers will be at the farm workers' houses. It is imperative that these consumers will be connected to the system without delay. First, because the Cooperative cannot begin to fulfill its objectives of rural area development until power is available to the people. Second, the Cooperative cannot operate feasibly without the revenue to be derived from this class of consumer.

Most of the workers' homes are nipa huts, clustered together on the farms and haciendas. Very few are wired for electricity and the cost of wiring each hut is probably beyond the capability of the individual farm laborer. The combined wiring cost for a multitude of nipa huts on each farm will probably pose a problem for the landowner. In order, then, to get these houses wired so that the workers' families can enjoy the benefits of electricity and the Cooperative secure the necessary revenues, we propose assistance in the wiring program.

We propose that the Cooperative make arrangements for wiring nipa huts, either through personnel on its own payroll or by contract with an electrical firm. The large number of huts involved will tend to minimize the average cost for each installation. In the following pages we show a sketch of the wiring arrangement for an average type installation. Each hut will be metered - the meter costs will be borne by the Cooperative and are not included here. One light is provided for a central location in the hut, and one duplex receptacle for service to fans, irons, radios or other appliances. There will be a fused safety switch, and construction standards will comply with provisions of the wiring code.

A cost for such an average installation has been derived as ₱46.40. Some homes may require more than one light, or facilities for connection of additional appliances. Proper judgment should be exercised at each individual hut but this cost estimate should be reasonable for discussing financing at this time.

Assuming that funds can be borrowed for this wiring program at 3-1/2% interest, we propose to contract with each landowner for loans to them represented by the actual cost of wiring the huts on their land, at an interest rate of 5-1/2% on the declining balance. Repayment will be made at the rate of ₱1/month/hut, including principal and interest, until the loan is fully repaid. Loans will thus be paid off in less than five years. If loan funds cannot be secured at 3-1/2% for this purpose we suggest that the interest rate which does apply should be increased by 2% in the contract with the landowner. This will provide funds for administration of the program.

This proposal has been discussed with the Board of Directors of VRESCO and there is agreement that this plan will be acceptable to the majority of the planters and the landowners. We therefore include in the loan application an amount of ₱363,000 for this purpose.

6600 huts wired @ ₱50 . . .	₱330,000
Contingency @ 10%	33,000
Total	₱363,000

This is a vital part of the Cooperative's development program. The loan should be repaid in 5 years and should be handled as a separate account completely apart from the general system.

SECTION 10

INVESTMENT AND OPERATING COSTS

INVESTMENT AND OPERATING COSTS

SECTION 10

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INVESTMENT AND OPERATING COSTS

A. Description:

The electric cooperative (VRESCO) has invested approximately ₱916,000 in an electric plant which serves some 53 members and 3 Poblacions. In the year 1967 its annual Gross Revenue is projected to be ₱166,000 and may have an estimated net loss of ₱35,000. This and other past record of deficits in Operating Margins is due to several factors but mainly it has been caused by a lack of sufficient capital to expand the existing system and connect new customers to the lines.

A review of the Statement of Financial Condition, for the first six months January 1st to June 30, 1967, (see Section No. 3, Analysis of Existing System) reflects a total asset of ₱1,176,351. The members have deposits and capital stock amounting to ₱709,427. The Electrification Administration had made a 3%, 25 years Rural Electrification Loan to the Cooperative amounting to ₱424,675 and to date ₱239,000 has been advanced. There is still a retention of loan funds in the amount of ₱185,675. It is expected that these unadvanced funds will be made available to VRESCO during the year. These monies will be needed to repay loans made with VMC Sugarcane Planters' Cooperative Marketing Association, Inc. (VICOMA) and the Victorias Milling Co., Inc. (VMC). VRESCO borrowed funds from VICOMA to complete the construction of electric facilities and this loan was made based on the assumption that the approved loan from E. A. would be released in the full amount. The future success of VRESCO is contingent on the advance of this balance of loan funds from the E. A. together with future low cost loan funds which will be needed to implement the proposed expansion of the Cooperative facilities.

B. Financial Forecast:

In the financial study of investment and operating cost a review was made of present procedures of management, accounting, collections and operating practices, not only of VRESCO, but of other electric utilities which are presently serving customers within the general geographic area of VRESCO. This was done so that we could make recommendations which will lead to a more efficient and effective operation of the cooperative. In this way adequate, dependable, low-cost electricity can be furnished to all persons in the cooperative's service territory.

We have outlined a system development program which will be required to meet the projected power demands over a period of 10 years. This development plan will influence the cooperative's credit-worthiness and indicates the financial justification for the needs of development and expansion of the existing facilities.

1. Determination of Load:

Load forecasts of maximum demands and annual KWH sales covering the ten-year study period were made (see Section No. 4, "Load and Energy Forecasts"). These load forecasts provide a basis for planning system development and expansion, and for determining where and when the system will need improvement and additional generating capacity. These loads may be conservative. However, if a more rapid rate of growth should develop, the system plan may readily be advanced to accommodate the larger demands and KWH sales.

a. Number of Consumers:

The number of consumers were projected from a load count of actual number of potential customers which were spotted on maps prepared in the field. A tabulation was made for each class of consumer: namely, Domestic, Commercial, School and Churches, Irrigation, Large Power and General Power. A reasonable percentage of growth was used for each class of electric consumer, for each year of the forecast.

In the first year after completion of construction it is expected that the cooperative will serve, by rate classification, a total of 6706 consumers. The rate of growth is as follows:

NUMBER OF CONSUMERS

Year	Number Added	Total
1969		6706
1970	161	6867
1971	161	7028
1972	170	7198
1973	171	7369
1974	193	7562
1975	214	7776
1976	204	7980
1977	210	8190
1978	216	8406

140

b. Average Monthly Usage:

Existing records of the cooperative were used for estimating KWH usage of the Landowner-Planter type of consumer. Since this type of consumer presently make up the major portion of existing services by the cooperative it was the only estimate and trend which could be used from existing records. The average monthly usage was computed for other type of consumers based on type of appliances and lighting expected to be used by each classification. These estimates were reviewed by comparing them to other electric utilities' customer average KWH usage here in the Philippines, and were found to be reasonable for each class of consumer. They may be a little on the conservative side. For actual estimates on KWH average monthly usage, reference should be made to Financial Forecast Form 325a, of this section.

c. Average Monthly Sales:

The average monthly sales were computed based on the number of consumers in each rate classification multiplied by the average monthly KWH usage for each class of consumer.

d. Annual Power Requirements:

The annual power requirements of the system for each year is the product of KWH sold each month to all consumers plus losses, multiplied by 12 months.

The annual power requirements are as follows:

ANNUAL POWER REQUIREMENTS

Year	KWH Sold x 1000	System Loss %	KWH Generated
1	5,664	.17	6,811,200
2	7,020	.17	8,474,400
3	8,526	.15	10,060,680
4	10,140	.15	11,863,800
5	11,868	.14	13,766,800
6	13,896	.13	15,980,400
7	15,972	.12	18,194,400
8	18,156	.12	20,516,280
9	20,508	.11	22,968,960
10	23,088	.11	25,858,560

2. Determination of Plant Investment:

The capital requirement for expansion and development of the cooperative over the next ten years (1969-1978) is computed to be ₱10, 957, 900. This estimate of capital required is based on certain capital investments each year which will be required to maintain the system's capability to serve the load within the area with dependable, adequate electric service. During the initial construction new plant will require an investment of ₱6, 333, 000 for the first year; ₱148, 800 for the second year and ₱1, 555, 200 for the third year. Funds are requested in the first loan application only to cover the initial construction and two years following. This capital investment will provide an excellent electric system, based on required design, during the early years of operation. Future funding of the construction program and system improvements will require additional capital. These required funds have been estimated and are as follows:

PLANT INVESTMENT
CONSTRUCTION EXPENDITURES

Year	Generation	Distribution	System Improvements	Other
1	₱2, 457, 000	₱3, 610, 100	₱ 30, 900	₱235, 000
2	-0-	148, 800	-0-	-0-
3	1, 228, 400	148, 800	178, 000	-0-
4	-0-	156, 000	-0-	-0-
5	-0-	156, 000	-0-	29, 000
6	1, 228, 500	174, 400	-0-	200, 000
7	-0-	191, 200	25, 000	78, 000
8	-0-	183, 200	25, 000	-0-
9	-0-	188, 800	25, 000	25, 000
10	-0-	192, 800	25, 000	18, 000

a. Plant Additions:

The additions to plant investment were determined from each year's construction expenditures. The addition for generating units is recorded as of the beginning of the year in which the generating unit is installed. For distribution lines, system improvements and general plant, the annual construction expenditures constitute the additions to plant for the year in which the work is performed.

All plant additions are based on needs which are outlined in the system design, and system improvements which will have to be made in order to furnish adequate electric service to the cooperative's existing and new consumers. Without improvements and new

generating units the cooperative will regress. To provide plant additions during the period 1972 to 1978 the cooperative will require new loan funds. These requirements of loan funds are as follows:

NEW LOAN REQUIREMENTS

Year	*Basis Date	Amount
1969	1974	₱8,037,000
1972	1975	341,000
1974	1977	1,897,100
1976	1979	447,000
1978	1981	471,600

*Basis Date: Date of First Principal Payment (interest payment to be made on a current basis).

b. Plant Retirements:

Experience on new electric systems indicate that retirements will be very small and inconsiderable during the early years of operations.

c. Plant Changes:

The existing Plant value has been placed at ₱916,050. This value will fluctuate from month to month based on investment in new facilities and depreciation of such plant. It is expected that the plant will increase in value from ₱0.9 million to ₱8.9 million in 1971 and to an approximate ₱9.3 million in 1973. For actual plant changes each year reference should be made to Form 325b of this section of report.

d. Source of Funds:

Funds needed for plant improvements and additions have been outlined in item (a) of this section. Based on the long-range financial forecast, compensatory rates will not supply the capital needed for the expanded construction program. Therefore, all new construction funds should come from loans. The rate charged will provide the revenue to amortize low cost loans over a period of 25 years.

3. Determination of Operating Revenue:

Operating revenues were estimated by classes of consumers according to the rate schedule proposed for each classification. The different groups are Planter-Owner houses, Planter-Overseers' houses,

Workers' houses, Small Commercial, Schools and Churches, Irrigation, Large Power, Security Lights and Other Utilities. Separate estimates were made for each class of consumers. Refer to Section No. 8, sub-section "E" for detailed analysis of estimated revenue.

The revenue, which is derived from rates charged each class of consumer, covers all costs of production and distribution expenses including depreciation, taxes and retirement of debt. The estimated revenues by years are as follows:

OPERATING REVENUE

Year	Amount ₱
1	840,218
2	1,020,529
3	1,214,653
4	1,421,152
5	1,643,282
6	1,890,460
7	1,151,330
8	2,403,420
9	2,674,186
10	2,961,587

4. Determination of Operating Expenses:

Operating expenses consist of power production cost, which includes cost of fuel, maintenance, depreciation, operations and general administrative expenses chargeable to the generation of electricity, distribution expenses, maintenance of lines, operation of lines, consumer accounting, collecting of accounts, administrative and other general expenses. All of the operating expenses were based on total plant investment and KWH sales per customer.

a. Cost of Power:

The cooperative is presently purchasing power from the Victorias Milling Company under a non-profit contract. This contract restricts the amount of power the cooperative may purchase and limits the total demand to 1000 KW. There is no load-factor commitment on energy. Power and energy cost is 4.3c/KWH. Under the non-profit contract - "Cost of Production" - it is expected that the cooperative will receive a refund after each audit period.

Existing restrictions of the purchase power agreement limits service to the cooperative, therefore, the quantity of power required would not be available from VMC. Based on this limitation a new power source will be needed. We made an evaluation of various methods of production which would meet the needs for expansion of the system, and it was determined that the most economical method is to install new diesel generators. (For a discussion on this refer to Section No. 7, Generation.)

Power cost expense estimates were based on expected efficiencies of a new diesel plant. The cost of fuel and lube oil is expected to be 1.89c/KWH during the first year, 1.82c/KWH the second year, and 1.75c/KWH the third year and 1.75c/KWH thereafter during the 10 year study period. It was assumed that fuel cost would remain fairly stable and only drastic changes in price would affect the cost of production. It is also possible that the average cost of power will be reduced if the cooperative continues to purchase available surplus power from VMC under the purchase power agreement. No allowances were made for this economy in our projections of power cost since the supply of power from VMC would only be secondary and not firm energy. We encourage the cooperative to use the power and energy VMC can furnish and such supplies should be integrated into the system operation. This will reduce the over-all cost per kwh and offer a saving to the cooperative.

Depreciation was taken as 5 percent of investment, and interest at 3-1/2 percent of generating plant value. These charges have been added to the fuel cost. An investigation of operating and administrative costs was made of diesel plants similar in size and cost, and such expense was approximately 2% of investment. Initial talks with the Victorias Milling Company indicate that agreements can be worked out whereby trained personnel of VMC could operate the generating equipment for the cooperative and this also would reduce the operating cost. However, these agreements have not been reached, therefore these potential reductions are not reflected in our estimates. It is recommended that the cooperative, through negotiation with VMC, investigate this idea which could be mutually beneficial to both parties. We have reason to believe that such agreement can be reached.

2%

COST OF POWER

Year	Cost per KWH
1	5.69c
2	4.86c
3	6.60c
4	6.00c
5	5.55c
6	5.88c
7	5.49c
8	5.16c
9	4.91c
10	4.65c

3%

b. Operating, Maintenance and General Administrative:

A labor survey was made of labor cost in the electric industry of the Philippines and a separate survey of labor cost in the Victorias area. These studies indicate that the cooperative can operate the system, with an adequate staff, efficiently and at a cost which will not exceed 3 percent of plant investment. Therefore, the operating, maintenance and general administrative costs have been computed to be 3 percent of plant investment, excluding generating facilities since allowance has already been included for this in the cost of power.

c. Depreciation:

Depreciation is a proper operating expense and it is most important that it be as accurate as possible.

DEPRECIATION RATES

Item	Average Life	Rate %	Assumed Weighted Av. %
Production			
Diesel	20	5	5
Distribution			
Station Equipment & Structures	33 1/3	3	
Poles & Fixtures	35	2.9	
O. H. Conductors	40	2.5	
Line Transformers	39	2.6	
Services	31	3.2	
Meters	33 1/3	3	2.9

Item	Average Life	Rate %	Assumed Weighted Av. %
General			
Structures	50	2	
Office & Shop Equipment	20	5	
Light Transportation	6	17	
Heavy Transportation	10	10	
Communication Equipment	12.5	8	8.4

The objective of depreciation is to charge to expense the capital investment in certain fixed assets, less salvage at time of retirement, over their useful lives. It is recognized that the cost of capital investments in plant is recovered by means of proper depreciation accounting. The charge to expense is accomplished by establishing depreciation rates as a percentage. This percentage is applied to the Capital Investment to yield a monthly or annual amount of depreciation expense. In the electric utility industry it has been found to be reasonable to group plant units. Although not all units in a given plant unit have identical characteristics or similar service life, it is possible to calculate a composite rate for each primary account, to arrive at a composite rate for a functional group, such as distribution property. We have calculated a composite rate of 3.2 percent for distribution and general plant and 5 percent was used for generating plant and facilities. These composite rates have been found to be reasonable.

The following table lists depreciation expenses:

DEPRECIATION EXPENSES

Year	Generation 5%	Plant 3.2%	Total
1	₱123,000	₱153,350	₱276,350
2	123,000	158,000	281,000
3	194,500	168,600	363,100
4	194,500	173,400	367,900
5	194,500	179,300	373,800
6	245,700	191,100	436,800
7	245,700	200,400	446,100
8	245,700	206,900	452,600
9	245,700	214,400	460,100
10	245,700	221,800	467,500

d. Taxes:

Taxes were computed at one-half percent of total plant investment, both distribution and generation. The cooperative would be exempt from municipal and income tax, as provided for under existing laws. In Republic Act No. 2023, "Philippine NONAGRICULTURAL COOPERATIVE ACT", the law provides the following exemptions:

(1) Cooperatives with net assets of not more than five hundred thousand pesos shall be exempt from all taxes and government fees of whatever name and nature except those provided for under this Act: Provided, however, That Cooperatives having net assets in excess of five hundred thousand pesos shall pay taxes as provided hereunder:

(a) Income Tax - They shall pay tax at the full rate as provided under existing laws on the amount allocated for interest on capital;

(b) Sales Tax - They shall pay fixed and percentage taxes at the full rate as provided under existing laws; and

(c) They shall pay all other taxes, unless otherwise provided herein at the full rate as provided under existing laws.

To keep the cooperative operating expenses to a minimum, it is recommended that the net assets be maintained below five hundred thousand pesos. It is also believed that when the cooperative act was passed no thought was given to non-profit rural electric cooperative operations. Therefore, if this law was amended, it would enable rural electric cooperative projects to function better in providing low cost, dependable electric service in the Philippines, which would be beneficial to the Government and its people.

5. Statement of Operations:

a. Revenues:

The projections of revenues and expenses are outlined in the following table:

OPERATING INCOME & EXPENSE STATEMENT

Year	Gross Revenue	Operating Expenses	Total Margins Operating & Non-Operating
1	₱ 840,218	₱ 954,328	₱ (104,800)
2	1,020,529	993,811	47,718
3	1,214,653	1,328,268	(68,615)
4	1,421,152	1,390,341	96,811
5	1,643,282	1,460,217	280,765
6	1,890,460	1,709,743	325,497
7	2,151,330	1,783,209	537,477
8	2,403,420	1,851,353	760,277
9	2,674,186	1,921,439	1,015,847
10	2,961,581	2,003,704	1,288,253

The revenues estimates are based on new rate schedules which are lower than existing rates of the cooperative (see Section No. 8 of this report). They provide the amount of revenue necessary to cover operating expenses, depreciation, interest payments, taxes and insurance for all years during the 10 year study period except the first and third year. During these two years it is expected that the cooperative will have deficits of ₱104,800 and ₱68,615. This is due to the heavy investment in generating equipment during these early years. We feel that it would not be prudent business to have the rates higher during this period just to offset these deficits. Higher rates would discourage high use, which also would reduce revenue and therefore maybe cause the losses to be even greater during the infancy years. The rates used will produce revenues which may exceed normal requirements during the seventh to tenth year, if the cooperative develops as we have reason to believe it will. Therefore, rates may be reduced at that time. Experience has proven that low rates produce more gross revenue by encouraging abundant use which in turn will also help increase the productivity of the people. This will play an important role in raising the social standards and living conditions of the cooperative members. This is one of the main objectives of the Cooperative and certainly justifies a prudent rate reduction.

Rates should not be reduced until the reserves have reached a level of 20% of plant investment. Here again it is believed that such reserve funds will reach this level in the sixth year of operations.

b. Expenses:

Expenses cover the cost of power production, cost of operations, maintenance and general administrative expense, depreciation,

taxes and interest. These were explained in the prior subsection number four.

c. Operating Margins:

Based on expected revenues and calculated expenses, operating margins will be produced in the following amounts, if rates are not reduced by the cooperative during the ten year study period:

OPERATING MARGINS

Year	Amount ₱
1	(104,800)
2	47,718
3	(68,615)
4	96,811
5	280,765
6	325,497
7	537,477
8	760,277
9	1,015,847
10	1,288,247

d. Non-Operating Margins:

Non-operating margins will be generated mostly from interest revenues which will be earned from investments of reserve funds. It is recommended that all reserve funds be placed in investments which are secure, liquid and earn a high rate of interest, with particular emphasis on the first two qualities. The cooperative should use the best advice available to them in making investments. We have assumed a 7 percent earned interest rate on reserve funds investments, which should produce non-operating margins as follows:

NON-OPERATING MARGINS

Year	Amount ₱
1	9,250
2	21,000
3	45,000
4	66,000
5	97,700
6	144,780
7	169,356
8	208,210
9	263,100
10	330,370

e. Debt Service:

SCHEDULED DEBT PAYMENTS

Year	Outstanding Debt	Interest	Principal
1	₱ 407,986	233,868	12,073
2	6,728,913	238,711	12,440
3	6,865,273	292,768	12,816
4	8,407,657	297,841	13,202
5	8,550,455	303,917	13,601
6	8,721,854	345,543	415,862
7	9,908,892	340,809	431,786
8	9,771,306	330,053	432,221
9	9,547,285	323,339	518,897
10	9,267,188	313,504	519,360

The outstanding debt at the beginning of each year is outlined in the above table. Accrued margins and depreciation reserve funds will produce the monies required to make these debt payments each year on scheduled repayment dates. We have assumed that the principal repayment on the first loan will be deferred during the first five years, and such repayment of principal be made over the next 20 years. Interest on this loan would be paid on a current basis. Future loans and borrowing of the cooperative should have a 3 year deferment period of repayment of principal. The deferment of principal payments (grace period) will give the cooperative time to become established and have all of the consumers connected necessary to produce revenues to meet expenses and debt service payments.

6. General Funds Summary:

Based on the study projection of the long-range financial forecast, compensatory rates will not supply the capital needed for the expanded construction program. However, the rates will produce the necessary money to amortize low-cost loans over a period of 25 years. It appears that the rates may be reduced after the first six or seven years of operation and is made possible by the increased use of electricity and the addition of new consumers.

Adequate general funds will be provided based on sound financial planning and, therefore, plans should be implemented to provide for the proposed cooperative development program. The study and financial forecast have resulted in the disclosure of certain conditions which lead to fairly clear conclusions as to the needs

of development and expansion of the cooperative facilities and services. It further appears that the cooperative will become self-supporting in the fifth year of operations, barring significant inflation in prices and wages.

The following Forms 325, 325a, 325c, and 325d tabulate all of the Data Used in the Project Study and Financial Forecast:

FINANCIAL FORECAST

DATE: AUGUST 1967

BORROWER DESIGNATION: VRESCO

A. STATEMENT OF OPERATIONS

ITEMS	19 69(1st)	19 70 (2nd)	19 71 (3rd)	19 72 (4th)	19 73 (5th)	19 74 (6th)	19 75 (7th)	19 76 (8th)	19 77 (9th)	19 78 (10th)
1. ACCRUAL BASIS										
a. OPERATING REVENUE Form 325c, Item 3)	840,218	1,020,529	1,214,653	1,421,152	1,643,282	1,890,460	2,151,330	2,403,420	2,674,186	2,961,587
b. COST OF POWER Form 325d, Sec. A, Item 1. c)	387,100	411,900	664,100	711,100	762,500	939,500	998,200	1,059,700	1,124,700	1,201,300
c. OPER. MAINT. AND GEN. ADM. Form 325d, Sec. A, Item 2. c)	143,760	151,300	158,000	162,500	168,100	179,200	187,900	194,000	201,000	207,900
d. DEPRECIATION Form 325d, Sec. A, Item 2. e)	153,350	158,076	168,600	173,400	179,300	191,100	200,400	206,900	214,400	221,800
e. TAXES Form 325d, Sec. A, Item 2. g)	36,250	37,000	44,800	45,500	46,400	54,400	55,900	57,700	58,000	59,200
f. INTEREST Form 325d, Sec. B, Item 2. j)	233,868	238,711	292,768	297,841	303,917	345,543	340,809	333,053	323,339	313,504
g. TOTAL OPERATING EXPENSES (Sum of Items 1. b thru 1. f)	954,328	993,811	1,328,268	1,390,341	1,460,217	1,709,743	1,783,209	1,851,353	1,921,439	2,003,704
h. OPERATING MARGINS (Item 1. a less 1. g)	(114,110)	26,718	(113,615)	30,811	183,065	180,717	368,121	552,067	752,747	957,883
i. NON-OPERATING MARGINS (Estimate - consider interest & merchandising revenues, etc.)	9,250	21,000	45,000	66,000	97,700	144,780	169,356	208,210	263,100	330,370
j. TOTAL ACCRUED MARGINS (Items 1. h plus 1. i)	(104,800)	47,718	(68,615)	96,811	280,765	325,497	537,477	760,277	1,015,847	1,288,253
2. CASH BASIS										
a. TOTAL ACCRUED MARGINS (Item 2. j above)	(104,800)	47,718	(68,615)	96,811	180,765	325,497	537,477	760,277	1,015,847	1,288,253
b. DEPRECIATION (Item 1. d above) Plant & Generation	276,350	281,000	363,100	367,900	373,800	436,800	446,100	452,600	460,100	467,500
c. INTEREST (Item 1. f above)	233,868	238,711	292,768	297,841	303,917	345,543	340,809	333,053	323,339	313,504
d. TOTAL (Sum of Items 2. a thru 2. c)	405,418	567,429	587,253	762,552	958,482	1,107,840	1,324,386	1,545,930	1,799,286	2,069,251
e. LESS: SCHEDULED DEBT SERVICE PAYMENTS Form 325d, Sec. B, Item 2. c)	245,491	251,151	305,584	311,043	317,518	761,405	772,595	765,274	842,236	832,864
f. CASH MARGINS AFTER SCHEDULED DEBT SERVICE (Item 2. d less 2. e)	159,477	316,278	281,669	451,509	640,964	346,435	551,791	780,656	957,050	1,236,387

B. GENERAL FUNDS SUMMARY

1. WORKING CAPITAL AND RESERVE FUNDS - BEGINNING OF YEAR (Item 5 below - prior year. First year must agree with Sec. C, Item 4 "Last Year" amount.)	138,976	298,453	614,731	896,400	1,347,909	1,988,873	2,177,408	2,335,200	2,275,800	2,322,600
2. CASH MARGINS AFTER DEBT SERVICE (Sec. A, Item 2. f above)	159,477	316,278	281,669	451,509	640,964	346,435	551,791	780,656	957,050	1,236,387
3. TOTAL AVAILABLE (Items 1 plus 2)	298,453	614,731	896,400	1,347,909	1,988,873	2,335,308	2,729,199	3,115,856	3,232,850	3,558,987
4. PROPOSED USES ("General fund"):										
a. Plant Additions & Replacements		20% TO BE HELD - -				157,900	193,999	30,619	10,250	1,192,197
b. Advance Payment on Debt							200,000	100,000	900,000	
c. Retire Members Deposits		RESERVE FUND FOR EMERGENCIES						376,287		
d. Retire Members Capital Stock								333,150		
e. TOTAL PROPOSED USES						157,900	393,999	840,056	910,250	1,192,197
5. WORKING CAPITAL AND RESERVE FUNDS - END OF YEAR (Item 3 less 4. e)	298,453	614,731	896,400	1,347,909	1,988,873	2,177,408	2,335,200	2,275,800	2,322,600	2,366,790

FORM 325 8-63

10.15

1/23

FINANCIAL FORECAST - DETERMINATION OF LOAD

ITEM	19	PREVIOUS YEARS 19	19 67	FUTURE YEARS 19 69 (1st)	19 70 (2nd)	19 71 (3rd)	19 72 (4th)	19 73 (5th)	19 74 (6th)	19 75 (7th)	19 76 (8th)	19 77 (9th)	19 78 (10th)
1. NUMBER OF CONSUMERS	*Enter monthly averages of the "Number of Consumers" and "Average Monthly Usage" for three previous years to establish trends, data may be obtained from Monthly Operating Reports and Annual Supplements. Make estimates for each year of the forecast period. Estimates previously approved by the board should be used unless determined to be no longer valid. Consumer classifications should be broken down by rate schedules or large power consumers listed individually when necessary to make reasonable estimates of revenue.*												
a. Rural Hacienda				196	216	236	255	275	320	365	410	455	500
b. Rural Landowner				64	74	84	94	104	114	124	134	144	154
c. Rural Worker			(2% growth)	6350	6475	6600	6735	6870	7000	7150	7290	7435	7585
d. Small Commercial				50	52	54	56	58	61	64	67	70	73
e. Schools and Churches				30	31	32	33	34	35	36	37	38	39
f. Irrigation				10	12	14	16	18	21	25	29	34	40
g. Large Power				3	4	5	6	7	8	9	10	11	12
h. Other Utilities				3	3	3	3	3	3	3	3	3	3
i. Security Lights				25	50	75	100	125	150	175	200	225	250
j.													
k. TOTAL				6731	6917	7103	7298	7494	7712	7951	8180	8415	8656
2. AVERAGE MONTHLY USAGE													
a. Rural Hacienda				350	390	440	490	550	580	610	640	670	700
b. Rural Landowner				1100	1190	1290	1400	1500	1630	1760	1900	2050	2210
c. Rural Worker				20	25	30	35	40	45	50	55	60	65
d. Small Commercial				125	135	145	155	165	175	185	195	205	215
e. Schools and Churches				100	105	110	115	120	125	130	135	140	145
f. Irrigation				2500	2500	2500	2500	2500	2500	2500	2500	2500	2500
g. Large Power				20,000	21,000	22,000	23,000	24,000	25,000	25,000	25,000	25,000	25,000
h. Other Utilities				37,000	41,500	46,500	52,000	58,000	65,000	73,000	81,000	91,000	102,000
i. Security Lights				50	50	50	50	50	50	50	50	50	50
j.													
3. AVERAGE MONTHLY SALES	*"Average Monthly Sales" is product of "Number of Consumers" and "Average Monthly Usage".*												
a. Rural Hacienda				69,000	84,000	104,000	125,000	151,000	186,000	223,000	263,000	305,000	350,000
b. Rural Landowner				70,000	88,000	108,000	132,000	156,000	186,000	218,000	255,000	295,000	340,000
c. Rural Worker				127,000	162,000	198,000	236,000	275,000	315,000	356,000	401,000	446,000	493,000
d. Small Commercial				6,000	7,000	8,000	9,000	10,000	11,000	12,000	13,000	14,000	16,000
e. Schools and Churches				3,000	3,000	4,000	4,000	4,000	4,000	5,000	5,000	5,000	6,000
f. Irrigation				25,000	30,000	35,000	40,000	45,000	53,000	63,000	73,000	85,000	100,000
g. Large Power				60,000	84,000	110,000	138,000	168,000	200,000	225,000	250,000	275,000	300,000
h. Other Utilities				111,000	124,500	139,500	156,000	174,000	195,000	219,000	243,000	273,000	306,000
i. Security Lights				1,000	3,000	4,000	5,000	6,000	8,000	9,000	10,000	11,000	13,000
j.													
k. TOTAL				473,000	588,500	710,500	845,000	989,000	1,158,000	1,330,000	1,513,000	1,709,000	1,924,000
4. ANNUAL POWER REQUIREMENTS	*For Previous Years - Data may be obtained from Operating Report and Annual Supplements.* *For Future Years - a. kwh sold - 12 times Item 3 k above, b. system loss - Estimate and enter as a decimal, i.e. .16, not 16%, c. kwh purchased - kwh sold ÷ (1.00 − system loss)*												
a. KWH SOLD				5,676,000	7,062,000	8,526,000	10,140,000	11,868,000	13,896,000	15,960,000	18,156,000	20,508,000	23,088,000
b. SYSTEM LOSS				0.17	0.17	0.15	0.15	0.14	0.13	0.12	0.12	0.11	0.11
c. KWH PURCHASED (generated)				6,811,200	8,474,400	10,060,680	11,863,800	13,766,800	15,980,400	18,194,400	20,516,280	22,968,960	25,858,560

FORM 325a 3-63

FINANCIAL FORECAST - DETERMINATION OF PLANT INVESTMENTS

ITEM	PREVIOUS YEARS 19	19	19 Existing	FUTURE YEARS 19 69 (1st)	19 70 (2nd)	19 71 (3rd)	19 72 (4th)	19 73 (5th)	19 74 (6th)	19 75 (7th)	19 76 (th)	19 77 (9th)	19 78 (10th)
1. PLANT ADDITIONS & REPLACEMENTS	New investment for system improvements can be arrived at by estimating the cost of expected changes and additions, or by determining the expected investment at some future time from the System Planning Report and subtracting present investment, the difference being the system improvements for the intervening years. An allowance may need to be made for upgrading services and transformers. Ordinary replacements can be estimated from experience on a lump sum basis, or by estimating the number of poles, transformers, etc. due to be replaced because of rot, rust, and wear-and-tear. Investment for new consumers can be determined by multiplying the estimated number of new services by an average cost per new service.												
a. DISTRIBUTION													
SYSTEM IMPROVEMENTS				30,900	-0-	178,000	-0-	-0-	-0-	20,000	20,000	20,000	20,000
ORDINARY REPLACEMENTS				-0-	-0-	-0-	-0-	-0-	-0-	5,000	5,000	5,000	5,000
NEW CONSUMERS				3,610,100	148,800	148,800	156,000	156,000	174,400	191,200	183,200	188,800	192,800
TOTAL DISTRIBUTION				3,641,000	148,800	326,800	156,000	156,000	174,400	216,200	208,200	213,800	217,800
b. ~~XXXXXXXX~~ Tools				25,000	-0-	-0-	-0-	-0-	-0-	20,000	-0-	-0-	-0-
c. GENERATION				2.457,000	-0-	1,228,400	-0-	-0-	1,228,500	-0-	-0-	-0-	-0-
d. HEADQUARTERS & Office Eqpt.				60,000			-0-	5,000	200,000	-0-	-0-	-0-	-0-
e. ~~XXXXXXXX~~ Communication				50,000	-0-	-0-	-0-	4,000	-0-	8,000	-0-	-0-	18,000
f. OTHER Transportation				100,000	-0-	-0-	-0-	20,000	-0-	50,000	-0-	25,000	-0-
*g. TOTAL PLANT ADDITIONS AND REPLACEMENTS			916,050	6,333,000	148,800	1,555,200	156,000	185,000	1,602,900	294,200	208,200	238,800	235,600
2. PLANT RETIREMENTS	Retirements can be estimated by (1) determining, from the Monthly Operating Report, or (2) estimating the number of plant units to be retired under various classifications, and multiplying these by the average unit ... Continuing Property ... results should be utilized where available.												
Distribution Plant				-0-	-0-	-0-	5,000	-0-	5,000	5,000	5,000	5,000	5,000
TOTAL RETIREMENTS			-0-	-0-	-0-	-0-	5,000	-0-	5,000	5,000	5,000	5,000	5,000
3. PLANT CHANGES													
a. PLANT BEGINNING OF YEAR (First forecast year must agree with "Last Year" amount, Item 1, Sec. C, Form 325)				916,050	7,249,050	7,397,850	8,953,050	9,104,050	9,289,050	10,886,950	11,176,150	11,379,350	11,613,150
*b. PLUS ADDITIONS & REPLACEMENTS (Item 1. g above)				6,333,000	148,800	1,555,200	156,000	185,000	1,602,900	294,200	208,200	238,800	235,800
c. LESS RETIREMENTS (Item 2 above)				-0-	-0-	-0-	5,000	-0-	5,000	5,000	5,000	5,000	5,000
d. PLANT END OF YEAR (Net sum of Item 3. a & 3. b less 3. c)			916,050	7,249,050	7,397,850	8,953,050	9,104,050	9,289,050	10,886,950	11,176,150	11,379,350	11,613,150	11,843,950
4. SOURCE OF FUNDS													
*a. PLANT ADDITIONS & REPLACEMENTS (Item 1. g above)			-0-	6,333,000	148,800	1,555,200	156,000	185,000	1,602,900	294,200	208,200	238,800	235,800
**b. LESS GEN. FUNDS TO BE INVESTED IN PLANT INCL. REPLACEMENTS (Amount shown in Item 4, Sec. B, Form 325)				-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-
c. LOAN FUND ADVANCES REQUIRED (Item 4. a less 4. b)				6,333,000	148,800	1,555,200	156,000	185,000	1,602,900	294,200	208,200	238,800	235,800

Form 325b

* Assume the salvage values and the costs of removal are equal, off-setting each other, and thereby the total capitalized costs and cash requirements for plant additions and replacements are the same.
** As a minimum include amounts for plant investments for which loan funds cannot be obtained

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BEST AVAILABLE DOCUMENT

FINANCIAL FORECAST - DETERMINATION OF OPERATING REVENUE

ITEM	PREVIOUS YEARS 19	19	19	FUTURE YEARS 1969 (1st)	1970 (2nd)	1971 (3rd)	1972 (4th)	1973 (5th)	1974 (6th)	1975 (7th)	1976 (8th)	1977 (9th)	1978 (10th)
ESTIMATED REVENUE BY "SLIPPAGE METHOD"	*Revenues can be estimated by classes of consumers according to the rate schedules, by classes of consumers according to the operating reports, or by total number of consumers. Systems whose kwh sales to commercial and other consumers total 20% or less of farm and residential sales for both prior and future years will probably find it satisfactory to make their revenue estimates as though all consumers were on a farm & home rate. Systems with a greater percentage will probably desire to make separate estimates by classes of consumers. In general, as average consumption increases, the difference between the charge as per rate schedule and the actual average revenue tends to decrease. Systems which have special block rates for water heaters or other uses generally should make special analyses of estimated revenue based on these factors.*											
RURAL HACIENDA													
a. AVG. MO. KWH PER CONSUMER (Form 325a, Item 2)				350	390	440	490	550	580	610	640	670	700
b. CHARGE AS PER RATE SCHEDULE (For kwh shown in Item a)				14.3c	13.8c	13.4c	13.1c	12.7c	12.6c	12.5c	12.3c	12.2c	12.1c
*c. % AVG. MO. REV. PER CONS. IS TO CHARGE AS PER RATE SCHEDULE													
**d. AVG. MONTHLY REVENUE PER CONSUMER				₱50.00	₱54.00	₱59.00	₱64.00	₱70.00	₱73.00	₱76.00	₱79.00	₱82.00	₱85.00
e. ANNUAL REVENUE PER CONSUMER (12 times Item d)				600.00	648.00	708.00	768.00	840.00	876.00	912.00	948.00	984.00	1,020.00
f. AVG. NUMBER OF CONSUMERS (Form 325a, Item 1)				196	216	236	255	275	320	365	410	455	500
g. ANNUAL REVENUE (Item e x f)				117,600	139,968	167,088	195,840	231,000	280,320	332,880	388,680	447,720	510,000
RURAL LANDOWNER													
a. AVG. MO. KWH PER CONSUMER (Form 325a, Item 2)				1100	1190	1290	1400	1500	1630	1760	1900	2050	2210
b. CHARGE AS PER RATE SCHEDULE (For kwh shown in Item a)				11.2c	10.9c	10.7c	10.5c	10.3c	10.1c	10.c	9.9c	9.7c	9.6c
*c. % AVG MO. REV. PER CONS. IS TO CHARGE AS PER RATE SCHEDULE													
**d. AVG. MONTHLY REVENUE PER CONSUMER				123.20	130.20	138.20	147.00	155.00	165.80	175.80	187.00	199.00	211.80
e. ANNUAL REVENUE PER CONSUMER (12 times Item d)				1476.00	1562.40	1658.40	1764.00	1860.00	1989.60	2109.60	2244.00	2388.00	2541.60
f. AVG. NUMBER OF CONSUMERS (Form 325a, Item 1)				64	74	84	94	104	114	124	134	144	154
g. ANNUAL REVENUE (Item e x f)				94,464	115,617	139,305	165,816	193,440	226,867	261,590	300,696	343,872	391,406
EST. REV. BY "REV. PER KWH SOLD METHOD"	*For irrigation consumers, extremely large power users and similar classifications if not estimated above, it may be preferable to base revenue estimates on revenue per kwh sold.*												
a. TOTAL MONTHLY KWH SOLD (Form 325a, Item 3)				SEE LAST PAGE FOR SUMMARY									
b. TOTAL ANNUAL KWH SOLD (12 x Item a)													
*c. AVERAGE REVENUE PER KWH SOLD													
**d. ANNUAL REVENUE													
1. TOTAL REV. FROM SALE OF ELEC. ENERGY (Total ann. rev. estimated above)													
2. OTHER OPERATING REVENUE (For prev. yrs. - system's records, forecast future yrs.)													
3. TOTAL OPERATING REVENUE (Items 1 and 2)													

FORM 325a 8-68

*For previous years, Item d ÷ b; forecast for future years. **For previous years, System's Records, for future years, Item b times c.

SCHEDULE SL

Availability:

In the area covered by the distribution system of the Cooperative, and where the municipal street lighting service rates do not apply.

Applicability:

Applicable, only under contract, to security lighting of customer property by means of Mercury-Vapor luminaries supported by short brackets mounted on wood poles of the Cooperative's existing distribution system or extensions from this system. In all cases the Mercury-Vapor luminaire, bracket and control equipment shall be installed, owned and maintained by the Cooperative. Security lighting service will be provided only at locations which are accessible to the Cooperative trucks for servicing purposes.

Rate (Per Lamp per Month):

Lamp Size	
7000 LUMEN-175W	₱12.00

NOTE: 1. Where it is necessary for the Cooperative to install an additional wood pole in order to provide security lighting service, a monthly charge of ₱4.00 shall be made for each such pole.

2. The word "maintain", as it applies to security lighting, is defined to mean the replacement of lamps, glassware and photo-control units as required, as soon as can reasonably be done after notification of the Cooperative by the customer that service has been interrupted. However, the customer shall reimburse the Cooperative for the cost of all such maintenance work which is required because of vandalism.

SCHEDULE - IRRIGATION

Availability:

In the area covered by the existing three-phase distribution lines of the Cooperative.

Applicability:

To any customer, for irrigation purposes, who agrees to use electric services only during off-peak hours of the electric distribution system, and agrees also to pay the cost of system improvement and additions necessary to provide the service. Otherwise, Schedule B will be applicable for such service.

Character of Service:

Three-phase, 60 cycles, at available secondary voltages.

Monthly Energy Charge:

Energy charge - ₱0.08 per KWH

Minimum Monthly Bill:

Minimum ₱30.00 per month.

Capital Investment:

The customer agrees to provide all funds to the Cooperative for any new capital investment the Cooperative would have to make to serve such irrigation load.

FINANCIAL FORECAST - DETERMINATION OF OPERATING REVENUE

ITEM	PREVIOUS YEARS 19	19	19	FUTURE YEARS 1969 (1st)	1970 (2nd)	1971 (3rd)	1972 (4th)	1973 (5th)	1974 (6th)	1975 (7th)	1976 (8th)	1977 (9th)	1978 (10th)
ESTIMATED REVENUE BY "SLIPPAGE METHOD"	*Revenues can be estimated by classes of consumers according to the rate schedules, by classes of consumers according to the operating reports, or by total number of consumers. Systems whose kwh sales to commercial and other consumers total 20% or less of farm and residential sales for both prior and future years will probably find it satisfactory to make their revenue estimates as though all consumers were on a farm & home rate. Systems with a greater percentage will probably desire to make separate estimates by classes of consumers. In general, as average consumption increases, the difference between the charge as per rate schedule and the actual average revenue tends to decrease. Systems which have special block rates for water heaters or other uses generally should make special analyses of estimated revenue based on these factors.*												
WORKER													
a. AVG. MO. KWH PER CONSUMER (Form 325a, Item ...)				20	25	30	35	40	45	50	55	60	65
b. CHARGE AS PER RATE SCHEDULE (For kwh shown in Item a)				25.0c	24.0c	23.3c	22.8c	22.5c	22.2c	22.0c	21.5c	21.0c	20.6c
*c. % AVG. MO. REV. PER CONS. IS TO CHARGE AS PER RATE SCHEDULE													
**d. AVG. MONTHLY REVENUE PER CONSUMER				5.00	6.00	7.00	8.00	9.00	10.00	11.00	11.80	12.60	13.40
e. ANNUAL REVENUE PER CONSUMER (12 times Item d)				60.00	72.00	84.00	96.00	108.00	120.00	132.00	141.60	151.20	160.80
f. AVG. NUMBER OF CONSUMERS (Form 325a, Item 1)				6350	6475	6600	6735	6870	7000	7150	7290	7435	7585
g. ANNUAL REVENUE (Item e x f)				381,000	466,200	554,400	648,560	744,120	840,000	943,800	1,032,264	1,124,172	1,219,668
SMALL COMMERCIAL													
a. AVG. MO. KWH PER CONSUMER (Form 325a, Item 2)				125	135	145	155	165	175	185	195	205	215
b. CHARGE AS PER RATE SCHEDULE (For kwh shown in Item a)				20.8c	20.4c	20.1c	19.9c	19.6c	19.4c	19.2c	19.0c	18.9c	18.7c
*c. % AVG MO. REV. PER CONS. IS TO CHARGE AS PER RATE SCHEDULE													
**d. AVG MONTHLY REVENUE PER CONSUMER				26.00	27.60	29.20	30.80	32.40	34.00	35.60	37.20	38.80	40.40
e. ANNUAL REVENUE PER CONSUMER (12 times Item d)				312.00	331.20	350.40	369.60	388.80	408.00	427.20	446.40	465.60	484.80
f. AVG NUMBER OF CONSUMERS (Form 325a, Item 1)				50	52	54	56	58	61	64	67	70	73
g. ANNUAL REVENUE (Item e x f)				15,600	17,222	18,921	20,687	22,550	24,888	27,340	29,908	32,592	35,390
EST. REV. BY "REV. PER KWH SOLD METHOD"	*For irrigation consumers, extremely large power consumers and similar classifications if not estimated above, it may be preferable to base revenue estimates on revenue per kwh sold.*												
a. TOTAL MONTHLY KWH SOLD (Form 325a, Item 3)						SEE LAST PAGE FOR SUMMARY							
b. TOTAL ANNUAL KWH SOLD (12 x Item a)													
*c. AVERAGE REVENUE PER KWH SOLD													
**d. ANNUAL REVENUE													
1. TOTAL REV. FROM SALE OF ELEC. ENERGY (Total ann. rev. estimated above)													
2. OTHER OPERATING REVENUE (For prev. yrs. - system's records, forecast future yrs.)													
3. TOTAL OPERATING REVENUE (Items 1 and 2)													

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*For previous years, Item d + e; forecast for future years. **For previous years, System's Records; for future years, Item b times c.

10.19

FINANCIAL FORECAST - DETERMINATION OF OPERATING REVENUE

ITEM	PREVIOUS YEARS 19	19	19	FUTURE YEARS 19 69 (1st)	19 70 (2nd)	19 71 (3rd)	19 72 (4th)	19 73 (5th)	19 74 (6th)	19 75 (7th)	19 76 (8th)	19 77 (9th)	19 78 (10th)
ESTIMATED REVENUE BY "SLIPPAGE METHOD"	*Revenues can be estimated by classes of consumers according to the rate schedules, by classes of consumers according to the operating reports, or by total number of consumers. Systems whose kwh sales to commercial and other consumers total 20% or less of farm and residential sales for both prior and future years will probably find it satisfactory to make their revenue estimates as though all consumers were on a farm & home rate. Systems with a greater percentage will probably desire to make separate estimates by classes of consumers. In general, as average consumption increases, the difference between the charge as per rate schedule and the actual average revenue tends to decrease. Systems which have special block rates for water heaters or other uses generally should make special analyses of estimated revenue based on these factors.*												
SCHOOL AND CHURCHES													
a. AVG. MO. KWH PER CONSUMER (Form 325a, Item 2)				100	105	110	115	120	125	130	135	140	145
b. CHARGE AS PER RATE SCHEDULE (For kwh shown in Item a.)				19.0c	18.7c	18.5c	18.2c	18.0c	17.8c	17.6c	17.4c	17.2c	17.1c
*c. % AVG. MO. REV. PER CONS. IS TO CHARGE AS PER RATE SCHEDULE													
**d. AVG. MONTHLY REVENUE PER CONSUMER				19.00	19.65	20.30	20.95	21.60	22.25	22.90	23.55	24.20	24.85
e. ANNUAL REVENUE PER CONSUMER (12 times Item d)				228.00	235.80	243.60	251.40	259.20	267.00	274.80	282.60	290.40	298.20
f. AVG. NUMBER OF CONSUMERS (Form 325a, Item 1)				30	31	32	33	34	35	36	37	38	39
g. ANNUAL REVENUE (Item e x f)				6,840	7,309	7,795	8,296	8,812	9,345	9,892	10,456	11,035	11,629
IRRIGATION													
a. AVG. MO. KWH PER CONSUMER (Form 325a, Item 2)				2500	2500	2500	2500	2500	2500	2500	2500	2500	2500
b. CHARGE AS PER RATE SCHEDULE (For kwh shown in Item a.)				8c	8c	8c	8c	8c	8c	8c	8c	8c	8c
*c. % AVG MO. REV. PER CONS. IS TO CHARGE AS PER RATE SCHEDULE													
**d. AVG. MONTHLY REVENUE PER CONSUMER				200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00
e. ANNUAL REVENUE PER CONSUMER (12 times Item a)				2400.00	2400.00	2400.00	2400.00	2400.00	2400.00	2400.00	2400.00	2400.00	2400.00
f. AVG. NUMBER OF CONSUMERS (Form 325a, Item 1)				10	12	14	16	18	21	25	29	34	40
g. ANNUAL REVENUE (Item e x f)				24,000	28,800	33,600	38,400	43,200	50,400	60,000	69,000	81,600	96,000
EST. REV. BY "REV. PER KWH SOLD METHOD"	*For irrigation consumers, extremely large power consumers and similar classifications of use, it may be preferable to base revenue estimates on revenue per kwh sold.*												
a. TOTAL MONTHLY KWH SOLD (Form 325a, Item 3)						SEE LAST PAGE FOR SUMMARY							
b. TOTAL ANNUAL KWH SOLD (12 x Item a)													
*c. AVERAGE REVENUE PER KWH SOLD													
**d. ANNUAL REVENUE													
1. TOTAL REV. FROM SALE OF ELEC. ENERGY (Total ann. rev. estimated above)													
2. OTHER OPERATING REVENUE (For prev. yrs. - system's records, forecast future yrs.)													
3. TOTAL OPERATING REVENUE (Items 1 and 2)													

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*For previous years, Item d ÷ b; forecast for future years. **For previous years, System's Records; for future years, Item b times c.

FINANCIAL FORECAST - DETERMINATION OF OPERATING REVENUE

ITEM	PREVIOUS YEARS 19	19	19	FUTURE YEARS 19 69 (1st)	19 70 (2nd)	19 71 (3rd)	19 72 (4th)	19 73 (5th)	19 74 (6th)	19 75 (7th)	19 76 (8th)	19 77 (9th)	19 78 (10th)
ESTIMATED REVENUE BY "SLIPPAGE METHOD"	*Revenues can be estimated by classes of consumers according to the rate schedules, by classes of consumers according to the operating reports, or by total number of consumers. Systems whose kwh sales to commercial and other consumers total 20% or less of farm and residential sales for both prior and future years will probably find it satisfactory to make their revenue estimates as though all consumers were on a farm & home rate. Systems with a greater percentage will probably desire to make separate estimates by classes of consumers. In general, as average consumption increases, the difference between the charge as per rate schedule and the actual average revenue tends to decrease. Systems which have special block rates for water heaters or other uses generally should make special analyses of estimated revenue based on these factors.*												
SECURITY LIGHTS													
a. AVG. MO. KWH PER CONSUMER *Form 325a, Item 2)*				50	50	50	50	50	50	50	50	50	50
b. CHARGE AS PER RATE SCHEDULE *(For kwh shown in Item a)*				24c	24c	24c	24c	24c	24c	24c	24c	24c	24c
*c. % AVG. MO. REV. PER CONS. IS TO CHARGE AS PER RATE SCHEDULE													
**d. AVG. MONTHLY REVENUE PER CONSUMER				₱12.00	₱12.00	₱12.00	₱12.00	₱12.00	₱12.00	₱12.00	₱12.00	₱12.00	₱12.00
e. ANNUAL REVENUE PER CONSUMER *(12 times Item d)*				₱300	₱600	₱900	₱1200	₱1500	₱1800	₱2100	₱2400	₱2700	₱3000
f. AVG. NUMBER OF CONSUMERS *Form 325a, Item 1)*				25	50	75	100	125	150	175	200	225	250
g. ANNUAL REVENUE *(Item e x f)*				₱3,600	₱7,200	₱10,800	₱14,400	₱18,000	₱21,600	₱25,200	₱28,800	₱32,400	₱36,000
a. AVG. MO. KWH PER CONSUMER *Form 325a, Item 2)*													
b. CHARGE AS PER RATE SCHEDULE *(For kwh shown in Item a)*													
*c. % AVG MO. REV. PER CONS. IS TO CHARGE AS PER RATE SCHEDULE													
**d. AVG. MONTHLY REVENUE PER CONSUMER													
e. ANNUAL REVENUE PER CONSUMER *(12 times Item d)*													
f. AVG. NUMBER OF CONSUMERS *Form 325a, Item 1)*													
g. ANNUAL REVENUE *(Item e x f)*													
EST. REV. BY "REV. PER KWH SOLD METHOD"	*For irrigation consumers, extremely large power consumers and similar classifications if not estimated above, it may be preferable to base revenue estimates on revenue per kwh sold.*												
a. TOTAL MONTHLY KWH SOLD *Form 325a, Item 3)*						SEE LAST PAGE FOR SUMMARY							
b. TOTAL ANNUAL KWH SOLD *(12 x Item a)*													
*c. AVERAGE REVENUE PER KWH SOLD													
**d. ANNUAL REVENUE													
1. TOTAL REV. FROM SALE OF ELEC. ENERGY *(Total ann. rev. estimated above)*													
2. OTHER OPERATING REVENUE *(For prev. yrs. - system's records; forecast future yrs.)*													
3. TOTAL OPERATING REVENUE *(Items 1 and 2)*													

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*For previous years, Item d ÷ b; forecast for future years. **For previous years, System's Records; for future years, Item b times c.

10.21

BEST AVAILABLE DOCUMENT

FINANCIAL FORECAST - DETERMINATION OF OPERATING REVENUE

ITEM	PREVIOUS YEARS 19	19	19	FUTURE YEARS 1969 (1st)	1970 (2nd)	1971 (3rd)	1972 (4th)	1973 (5th)	1974 (6th)	1975 (7th)	1976 (8th)	1977 (9th)	1978 (10th)
ESTIMATED REVENUE BY "SLIPPAGE METHOD"	*Revenues can be estimated by classes of consumers according to the rate schedules, by classes of consumers according to the operating reports, or by total number of consumers. Systems whose kwh sales to commercial and other consumers total 20% or less of farm and residential sales for both prior and future years will probably find it satisfactory to make their revenue estimates as though all consumers were on a farm & home rate. Systems with a greater percentage will probably desire to make separate estimates by classes of consumers. In general, as average consumption increases, the difference between the charge as per rate schedule and the actual average revenue tends to decrease. Systems which have special block rates for water heaters or other uses generally should make special analyses of estimated revenue based on these factors.*											
LARGE POWER													
a. AVG. MO. KWH PER CONSUMER *Form 325a, Item 2)*				20,000	21,000	22,000	23,000	24,000	25,000	25,000	25,000	25,000	25,000
b. CHARGE AS PER RATE SCHEDULE *(For kwh shown in Item a)*				9.9c	9.8c	9.7c	9.6c	9.5c	9.4c	9.4c	9.4c	9.4c	9.4c
*c. % AVG. MO. REV. PER CONS. IS TO CHARGE AS PER RATE SCHEDULE													
**d. AVG. MONTHLY REVENUE PER CONSUMER				1,990	2,065	2,140	2,215	2,290	2,365	2,365	2,365	2,365	2,365
e. ANNUAL REVENUE PER CONSUMER *(12 times Item d)*				23,880	24,780	25,680	26,580	27,480	28,380	28,380	28,380	28,380	28,380
f. AVG. NUMBER OF CONSUMERS *Form 325a, Item 1)*				3	4	5	6	7	8	9	10	11	12
g. ANNUAL REVENUE *(Item e x f)*				71,640	99,120	128,400	159,480	192,360	227,040	255,420	283,800	312,180	340,560
OTHER UTILITIES													
a. AVG. MO. KWH PER CONSUMER *Form 325a, Item 2)*				37,000	41,500	46,500	52,000	58,000	65,000	73,000	81,000	91,000	102,000
b. CHARGE AS PER RATE SCHEDULE *(For kwh shown in Item a)*				9.42c	9.31c	9.22c	9.17c	9.09c	9.00c	8.95c	8.91c	8.81c	8.74c
*c. % AVG MO. REV. PER CONS. IS TO CHARGE AS PER RATE SCHEDULE													
**d. AVG. MONTHLY REVENUE PER CONSUMER				3,485	3,863	4,287	4,768	5,272	5,850	6,533	7,217	8,017	8,914
e. ANNUAL REVENUE PER CONSUMER *(12 times Item d)*													
f. AVG. NUMBER OF CONSUMERS *Form 325a, Item 1)*				3	3	3	3	3	3	3	3	3	3
g. ANNUAL REVENUE *(Item e x f)*				125,474	139,091	154,342	171,662	189,799	210,600	235,206	268,815	288,615	320,932
EST. REV. BY "REV. PER KWH SOLD METHOD"	*For irrigation consumers, extremely large power consumers and similar classifications of not estimated above, it may be preferable to base revenue estimates on revenue per kwh sold.*												
a. TOTAL MONTHLY KWH SOLD *Form 325a, Item 3)*				473,000	588,500	710,500	845,000	989,000	1,155,666	1,330,000	1,513,000	1,709,000	1,924,000
b. TOTAL ANNUAL KWH SOLD *(12 x Item a)*				5,676,000	7,062,000	8,526,000	10,140,000	11,868,000	13,868,000	15,960,000	18,156,000	20,508,000	23,088,000
*c. AVERAGE REVENUE PER KWH SOLD				14.8c	14.5c	14.3	14.0	13.8c	13.6c	13.5c	13.2c	13.0c	12.8c
**d. ANNUAL REVENUE				840,218	1,020,529	1,214,653	1,421,152	1,643,282	1,890,460	2,151,330	2,403,420	2,674,186	2,961,587
1. TOTAL REV. FROM SALE OF ELEC. ENERGY *(Total ann. rev. estimated above)*				840,218	1,020,529	1,214,653	1,421,152	1,643,282	1,890,460	2,151,330	2,403,420	2,674,186	2,961,587
2. OTHER OPERATING REVENUE *(For prev. yrs. - system's records; forecast future yrs.)*				-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-
3. TOTAL OPERATING REVENUE *(Items 1 and 2)*				840,218	1,020,529	1,214,653	1,421,152	1,643,282	1,890,460	2,151,330	2,403,420	2,674,186	2,961,587

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*For previous yr rs, Item d - b; forecast for future years. **For previous years, System's Records; for future years, Item b times c.

FINANCIAL FORECAST - DETERMINATION OF OPERATING EXPENSES & DEBT SERVICE

A. OPERATING EXPENSES

ITEM	PREVIOUS YEARS 19	19	19 Existing	FUTURE YEARS 1969 (1st)	1970 (2nd)	1971 (3rd)	1972 (4th)	1973 (5th)	1974 (6th)	1975 (7th)	1976 (8th)	1977 (9th)	1978 (10th)
1. COST OF POWER													
a. KWH PURCHASED (generated) | Form 325a, Item 4. c)				6,811,200	8,474,400	10,050,680	11,863,800	13,766,800	15,980,400	18,194,400	20,516,280	22,968,960	25,858,560
b. AVG. COST PER KWH (For previous yrs. - Item c ÷ a; for future yrs. - estimate)				5.69	4.86	6.60	6.00	5.55	5.88	5.49	5.16	4.91	4.65
c. COST OF POWER (For previous yrs. - System Record; future yrs. - Item a x b)				₱387,100	₱411,900	₱664,100	₱711,100	₱762,500	₱939,500	₱998,200	₱1,059,700	₱1,124,700	₱1,201,300
2. OTHER OPERATING EXPENSES	For previous years: (1) Enter Data for Items c, e and g. Data may be obtained from December Monthly Operating Reports. (2) Determine Items a, c and g as percent of plant, end of year, and enter percents in Items b, d and f respectively. For future years: (1) Forecast Items b, d and f for each year of the forecast period. (2) Multiply Item a. by Items b, d and f and enter products in Items c, e and g respectively.												
a. PLANT END OF YEAR (From Form 325b, Item 3. d) With Generation			916,050	*4,792,050	*4,940,850	*5,267,650	*5,418,650	*5,603,650	*5,973,050	6,262,250	*6,465,450	*6,699,250	*6,930,050
				7,249,050	7,397,850	8,953,050	9,104,050	9,289,050	10,886,950	11,176,150	11,379,350	11,613,150	11,843,950
b. OPER. MAINT. & GENERAL ADM. AS % OF PLANT Excluding Generation			N/A	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
c. OPER. MAINT. & GEN. ADMINISTRATIVE (Incl. power sales expense)			N/A	143,760	148,200	158,000	162,500	168,100	179,200	187,900	194,000	201,000	207,900
d. DEPRECIATION AS % OF PLANT 3.2%			N/A	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%
e. DEPRECIATION Excluding Generation			N/A	153,350	158,000	168,600	173,400	179,300	191,100	200,400	206,900	214,400	221,800
f. TAXES AS % OF PLANT 0.50%			N/A	0.50%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
g. TAXES			N/A	36,250	37,000	44,800	45,500	46,400	54,400	55,900	57,700	58,000	59,200

B. DEBT SERVICE (See instructions)

1. APPLICATION OF REQUIRED LOAN FUND ADVANCES TO NOTES

NOTE NO.	DATE OF NOTE	BASIS DATE	AMOUNT	PREV. ADVANCES	FUTURE YEARS 19 69	19 70	19 71	19 72	19 73	19 74	19 75	19 76	19 77	19 78
E.A. Loan	Mar 8, 1965		*424,675	239,000	*185,675	* The Balance of these Funds Should Be Advanced Prior to 1969 by E. A.								
New Loan	1969	1974	8,037,000		6,333,000	148,800	1,555,200							
New Loan	1972	1975	341,000					156,000	185,000					
New Loan	1974	1977	1,897,100							1,602,900	294,200			
New Loan	1976	1979	447,000									208,200	238,800	
New Loan	1978	1981	471,600											235,800

2. DETERMINATION OF DEBT PAYMENTS

	19 69	19 70	19 71	19 72	19 73	19 74	19 75	19 76	19 77	19 78
a. TOTAL PAYMENTS DUE BEGINNING OF YEAR	245,941	245,941	251,151	305,584	311,043	317,518	761,405	772,595	765,274	842,236
b. PLUS: INTEREST PAYMENTS ON ADVANCES DURING THE YEAR	-0-	5,210	54,433	5,459	6,475	56,101	10,297	7,287	8,358	8,253
c. PLUS: ADDITIONAL PRINCIPAL PAYMENTS BECOMING DUE DURING THE YEAR	-0-					401,850	15,500		86,227	
d. LESS: TOTAL ANN. PAYMENT ON NOTES RETIRED DURING THE YEAR	-0-					*(14,064)	*(14,607)	*(14,608)	* (17,623)	* (17,625)
e. TOTAL PAYMENTS DUE, END OF YEAR	245,941	251,151	305,584	311,043	317,518	761,405	772,595	765,274	842,236	832,864
f. LESS: CURRENT INTEREST FOR THE YEAR	233,868	238,711	292,768	297,841	303,917	345,543	340,809	333,053	323,339	313,504
g. AMORTIZATION OF OUTSTANDING DEBT	12,073	12,440	12,816	13,202	13,601	415,862	431,786	432,221	518,897	519,360

3. DETERMINATION OF OUTSTANDING DEBT

a. OUTSTANDING DEBT BEGINNING OF YEAR	407,986	6,728,913	6,865,273	8,407,657	8,550,455	8,721,854	9,908,892	9,771,306	9,547,285	9,267,188
b. PLUS: LOAN FUND ADVANCES	6,333,000	148,800	1,555,200	156,000	185,000	1,602,900	294,200	208,200	238,800	235,800
c. LESS: SCHEDULED PAYMENTS	12,073	12,440	12,816	13,202	13,601	415,862	431,786	432,221	518,897	519,360
d. LESS: ADVANCE PAYMENTS	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-
e. OUTSTANDING DEBT, END OF YEAR	6,728,913	6,865,273	8,407,657	8,550,455	8,721,854	9,908,892	9,771,306	9,547,285	9,267,188	8,983,628

* Quarter Annual Payment.

10.23

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SECTION 11

LOAN APPLICATION

LOAN APPLICATION

Section 11

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A. Distribution and Generation Loan Application Request:

The Victorias-Manapla-Cadiz Rural Electric Service Cooperative, organized under Republic of the Philippines laws, of Victorias, Negros Occidental, R. P., herewith makes application to the U. S. Agency for International Development and the National Economic Council of the Philippine Government for a loan to be used as outlined in the attached feasibility loan application study, to finance electric facilities in the amount of ₱8,037,000 summarized by purposes as follows:

REQUEST BY LOAN PURPOSE

1.	Distribution Facilities	₱ 3,985,010
2.	Generation Facilities	3,150,000
3.	All other	901,990
	Total Loan Application	₱ 8,037,000

It is requested that the initial note for carrying out the purposes of this loan shall be in the full amount of the loan and provide for an interest rate not to exceed 3-1/2 percent and also provide for principal payments to begin five (5) years from the date thereof and such note to be amortized over a twenty-five (25) year period.

VMC Rural Electric Service Cooperative agrees that the ten (10) year financial forecast, as prepared, is an acceptable projection of the trends and conditions of the cooperative and recommends that it will be used as a guide for management decisions.

1. Cost Estimates and Loan Budget:

a. DISTRIBUTION (7.6/13.2 kv)

(1) New pole line KM (excluding tie lines):

		Km.	Cost Estimates
Single Phase	- 2 wire	317	₱1,145,630
V Phase	- 3 wire	324	737,640
Three Phase	- 4 wire	38	267,840
Consumers	- 7,100	696*	Total Km.
Above includes:*			
Secondary		84	
Services		202	
Underbuild		38	
	Sub-Total		₱2,151,110

(2) New Tie-Lines:

Location	Description	Km.		
ABC 26-ABC 38	3Ø 1/0 ACSR	12.8	₱	90,360
ABC 13.1-ABC 13.2	" " "	2.1		15,000
ABC4.3-2A5.1	" " "	2.1		15,000
	Sub-Total		₱	120,360

(3) Conversion and line changes:

Location	Description	Km.		
ABC3-AB3.1	VØ 1/0 ACSR to 3Ø 1/0 ACSR	2	₱	5,220
ABC20-ABC24.1	1Ø 4ACSR to 3Ø 1/0 ACSR	3		15,030
ABC24.1-ABC24.2	1Ø 4 ACSR to 3Ø 4 ACSR	2		5,400
ABC19-ABC26	3Ø 1/0 ACSR to two 3Ø 1/0 ACSR	3		10,770
ABC24.1-ABC4.1	1Ø 1/0 ACSR to 3Ø ACSR	5.4		14,260
ABC4.2-ABC5	1Ø 1/0 ACSR to 3Ø ACSR	2.6		6,860
	Sub-Total		₱	57,540

(4) New substations, Switching, etc.:

1 - Switching station at Manapla plant ₱ 50,000

(5) Miscellaneous distribution equipment:

(a) Transformers and meters:

(i) To serve the new consumers in this loan:

No. transformers 5,000 kva

No. meters 7,000 ₱1,060,000

(b) Sectionalizing equipment 59,200

Sub-Total ₱1,119,200

(6) Right-of-way Clearing	20,000
(7) Engineering fees	466,800
TOTAL DISTRIBUTION	₱3,985,010

b. GENERATION

Diesel (Fuel, Bunker "C") Capacity 5,250 kw	₱3,150,000
TOTAL GENERATION	₱3,150,000

c. ALL OTHER

(1) Contingencies and overhead	666,990
(2) Transportation equipment	100,000
(3) Communication equipment	50,000
(4) Line and shop tools	25,000
(5) Office equipment	60,000
TOTAL - ALL OTHERS	901,990
GRAND TOTAL - ALL COSTS	₱8,037,000

COST ESTIMATE
U. S. DOLLAR-PESO COST COMPONENTS[1/]

Description of Work:

First Year Construction	KM	Cost/Km	Pesos Total Cost	US $	PESOS
New 1 ϕ ACSR Line (Main Line	260.0	3,610.00	938,600	192,040	187,720
New 1 ϕ ACSR (Subsidiary Taps)	50.0	3,610.00	180,500	36,930	36,100
New 1 ϕ 1/o ACSR Line	7.0	3,790 00	26,530	5,430	5,300
New 3 ϕ 4 ACSR Line	21.0	6,820.00	143,220	29,300	28,650
New 3 ϕ 1/o ACSR Line	14.0	7,080.00	99,120	20,290	19,800
New 3 ϕ 1/o ACSR-Future D. C.	3.0	8,500.00	25,500	5,220	5,100
Conversion					
2 ϕ 1/o to 3 ϕ 1/o ACSR	2.0	2,610.00	5,220	1,060	1,050
1 ϕ 4 ACSR to 3 ϕ 1/o ACSR	3.0	5,010.00	15,030	3,080	3,000
1 ϕ 4 ACSR to 3 ϕ 4 ACSR	2.0	2,700.00	5,400	1,100	1,100
Third Year Construction					
Construct 3 ϕ 1/o ACSR	17.0	7,080.00	120,360	24,600	24,100
Convert 3 ϕ 1/o ACSR to D. C. 1/o ACSR	3.0	3,590.00	10,770	2,190	2,200
Convert 1 ϕ 1/o ACSR to 3 ϕ 1/o ACSR	8.0	2,640.00	21,120	4,330	4,200
Services	202.0	1,400.00	282,800	57,850	56,600
Secondary's	84.0	4,510.00	378,840	77,500	75,800
Underbuilt	38.0	2,000.00	76,000	15,550	15,200
Transformers-KVA	5000 KVA	100 00/KVA	500,000	121,480	25,000
Meters	7000 Units	80.00/ea.	560,000	128,900	56,000
Oil Circuit Recloser	74 Units	800.00/ea.	59,200	13,630	5,900
Generator & Plant-1st Year	2-1750 kw Units	600.00/kw	2,100,000	504,860	126,000
" " " -3rd Year	1-1750 kw Units	600.00/kw	1,050,000	252,430	63,000
Switching Station	1 Unit	50,000.00/ea	50,000	10,230	10,000
Right-of-Way Clearing	100	200.00	20,000	-0-	20,000
Sub-Total			₱6,668,210	$1,508,000	₱771,820
Contingencies & Overhead @ 10%			666,990	136,470	133,400
Engineering @ 7%			466,800	47,830	279,800
SUB-TOTAL			₱7,802,000	$1,692,300	₱1,185,020
General Plant Investment					
Transportation Equipment					
1-Jeep Station Wagon			100,000	25,600	-0-
1-Line Truck-A-Frame 2-1/2 Ton					
2-Pick Up Truck-4 Wheel Drive					
1-Pole Trailer					

11.4

[1/] This estimate has maximum U. S. dollar cost and minimum peso cost. Other components of total funds required are possible. The estimate may be changed to minimum U. S. dollar amount of $1,294,595 and maximum peso amount of ₱3 475 209.

COST ESTIMATE
U. S. DOLLAR-PESO COST COMPONENTS[1/]
(Sheet No. 2)

	KM	Cost/Km	Pesos Total Cost	US $	PESOS
Communication Equipment 3 Base Station 6 Mobile Unit 1 Antenna & Assoc. Equipment			50,000	12,800	-0-
Line Tools-Shop Tools			25,000	6,400	-0-
Office Equipment			60,000	13,800	6,000
Total			₱235,000	$58,600	₱6,000
Wiring Plan Investment					
Wiring Plan (Nipa) 6,600 @ ₱50.00 ea.			330,000	-0-	330,000
Contingencies @ 10%			33,000	-0-	33,000
Total			₱363,000		₱363,000
Sub-Total			₱8,400,000	$1,750,900	₱1,554,020
Working Capital Required			137,000	-0-	137,000
Grand Total Required			₱8,537,000	$1,750,900	₱1,691,020

*Pesos to US Dollar Rate - 3.91

11.5

[1/] This estimate has maximum U. S. dollar cost and minimum peso cost. Other components of total funds required are possible. The estimate may be changed to minimum U. S. dollar amount of $1,294,595 and maximum peso amount of ₱3,475,209.

3. Board Resolution:

VICTORIAS-MANAPLA-CADIZ RURAL ELECTRIC SERVICE COOPERATIVE

September, 1967

RESOLUTION

NOW, THEREFORE, BE IT RESOLVED, that the Victorias-Manapla-Cadiz Rural Electric Service Cooperative make application to the United States Agency for International Development and the National Economic Council of the Philippine Government for a loan to be used to finance rural electric facilities as detailed in the "Engineering - Feasibility and Loan Application Report", dated August, 1967, in the amount of ₱8,037,000 summarized by purpose as follows:

1.	Distribution facilities	₱3,985,010
2.	Generation facilities	3,150,000
3.	Contingencies, transportation, communications, tools and equipment	901,990
		₱8,037,000

BE IT FURTHER RESOLVED, that the loan shall provide for principal payments to begin 5 years from the date of the note, shall be for a period not less than 25 years including the grace period, at an interest rate not to exceed 3-1/2% per annum, and be composed of dollar and peso components as derived in the report.

I, Romeo R. Ascalon, Secretary of Victorias-Manapla-Cadiz Rural Electric Service Cooperative do hereby certify that the above is a true and correct copy of a resolution contained in the minutes of the meeting of the Board of Directors of VRESCO, held on the 6th day of September, 1967 at which meeting a quorum was present.

/s/ Romeo R. Ascalon
ROMEO R. ASCALON

B. Wiring and Working Capital Loan:

The Victorias-Manapla-Cadiz Rural Electric Service Cooperative, organized under Republic of the Philippines laws, of Victorias, Negros Occidental, R.P., herewith makes application to the U.S. Agency for International Development and the National Economic Council of the Philippine Government for a loan to be used as outlined in the attached feasibility loan application study, to finance electric wiring facilities and for working capital in the amount of ₱363,000 and ₱137,000 respectively, making a total request of ₱500,000. These monies will be used as outlined in the following table:

Wiring 6600 Nipa Huts	₱330,000
Contingency @ 10%	33,000
Total	₱333,000
Working Capital (Material Inventory, General Funds, Monthly Payroll Fund, & Petty Cash)	137,000
Total	₱500,000

It is requested that the initial note for carrying out the wiring program and purposes of this loan shall be in the full amount of the loan and provide for an interest rate not to exceed 3-1/2 percent and also provide for the principal payment to come due five (5) years from the date thereof and to be repaid in one lump sum. Interest to be paid each year as due. The monies loaned for the wiring program shall be reloaned to landowners for the actual cost of wiring huts on their land, at an interest rate of 5-1/2 percent on the declining balance.

1. Board Resolution:

VICTORIAS-MANAPLA-CADIZ RURAL ELECTRIC SERVICE COOPERATIVE

September, 1967

RESOLUTION

WHEREAS, it will be necessary to provide help in wiring farm workers' houses so that these members may be afforded the benefits of electric service without delay, and the Cooperative derive revenues necessary for proper operation, and

WHEREAS, certain working funds will have to be available to the Cooperative during a period of organization and until such time as revenues are adequate to provide necessary funds,

NOW, THEREFORE, BE IT RESOLVED, that application be made to the U.S. Agency for International Development and the National Economic Council of the Philippine Government for a loan to be used to finance a wiring program and provide working funds, in the amount of ₱500,000, summarized by purpose as follows:

Wiring Program	₱363,000
Working Fund	₱137,000
Total	₱500,000

BE IT FURTHER RESOLVED, that the loan shall provide for principal repayment, in full, 5 years after the date of the note, and shall carry an interest rate not to exceed 3-1/2% per annum.

I, Romeo R. Ascalon, Secretary of Victorias-Manapla-Cadiz Rural Electric Service Cooperative do hereby certify that the above is a true and correct copy of a resolution contained in the minutes of the meeting of the Board of Directors of VRESCO, held on the 6th day of September, 1967 at which meeting a quorum was present.

/s/ Romeo R. Ascalon
ROMEO R. ASCALON

VICTORIAS - MANAPLA - CADIZ

RURAL ELECTRIC

SERVICE COOPERATIVE

ADDENDUM

to the

Engineering - Feasibility - and Loan Application Report

April 1968

By: Philip Parker
NRECA Team

This addendum has been prepared for the Victorias-Manapla-Cadiz Rural Electric Service Cooperative report. Review of data in the report, by AID/Washington engineering staff, has shown a need for reconsideration of the proposed costs for generating facilities. In the following pages we will develop reasons for the change, new cost figures, and also explore the effect these may have on the project and its feasibility.

A figure of $150 per kw of generating capacity required is established in the report. This cost was used based on actual records of similar installations at various locations in the Philippines, from discussion with manufacturers' representatives in Manila, and from information supplied by engineers and plant operators experienced in local conditions. We believe this cost is reasonable and adequate where the project is subject to open international bidding. However, under the conditions of the loan in this case the bidding will be restricted to cover only equipment produced with US labor and materials. To establish a reasonable cost under these conditions we have sought advice from qualified staff of REA, and considered information supplied by several manufacturers. We approached the estimate from two directions:

(1) REA suggested that a similar installation in the US would cost about $275 per kw. However, labor and installation costs in the Philippines would be much lower, as would the cost of local materials and supplies. Common labor there costs ₱ 6 per day ($1.50)--a skilled mechanic can be hired for less than $100 per month--and a graduate electrical engineer with years of experience for about $125 per

month. Applying these lower cost factors gave a cost estimate of $215 per kw for the installation in the Philippines using equipment built in the US.

(2) We also discussed with several manufacturers the incremental costs due to the bidding conditions which might be expected to apply above the base cost given in the report. From this data we were also able to support the new estimate of $215 per kw.

We therefore recommend that the loan funds be established using a cost of $215 per kw in lieu of the $150 per kw figure used in the report.

The recent discussions have also indicated two other factors which have bearing on the project and require emphasis at this time:

(1) Industry standards will be better satisfied through bids for 2000 kw units rather than the 1750 kw figure. The Cooperative will probably benefit from a better cost per kw figure for the slightly larger units. This choice is supported also when considered in conjunction with (2) which follows.

(2) The Cooperative has received a surplus generating plant of 1500 kw total capacity, under the AID/Manila program for disposal of surplus equipment. The obvious advantages to the project in having this plant to meet current needs--and especially its requirement this winter during VMC's

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off-milling season--have already been shown. The plant consists of five units each of 300 kw capacity and is old but serviceable. When new, large units are installed for the base-load, these smaller units will continue to serve the Cooperative well as stand-by and peaking units.

By giving consideration then to an initial installation of two units each of 2000 kw, and realizing the contribution to be made by the surplus plant, we can defer the third large unit beyond the third year of operation, if growth and development follow reasonably close to projections. Both the third and fourth units will have to be installed at appropriate times in the system development. AID's interest and concern for the project will undoubtedly lead to every effort being made to further assist the Cooperative when those times arrive. The initial loan, now under consideration, may therefore be limited to two units of the 2000 kw size.

This adjustment in provisions for generating facilities will make only slight change in the total project cost. The changes are as follows, and reference should be made to pages 11.4 and 11.5 of the report:

Original report:

	Total Cost (₱)	US$	₱
3 units of 1750 @ ₱600 per kw	3,150,000	757,290	189,000

Amended figures:

2 units of 2000 kw @ ₱840 per kw	3,360,000	810,000	189,000
Difference	+ 210,000	+ 52,710	-0-

It is quite advantageous to the expansion of the VRESCO system that reasonable cost long term financing be available for these generatin unit additions. It is to A.I.D.'s interest in providing a successful demonstration through these projects, to support rapid expansion of the system. Therefore, A.I.D. may wish to further assist the cooperative at the time of the unit additions.

When appropriate allowance is made for contingencies, overhead and engineering the grand total for the project cost is as follows:

Total Cost (₱)	Components	
	US$	₱
8,782,500	1,815,000	1,691,020

This represents an increase of only 3% in the project cost, which should not be a significant factor in view of the fact that the estimate contains a 10% figure for contingencies. Final costs will be adjusted, of course, to actual expenditures.

The report develops its costs and financial forecasts using a percentage of plant investment as a basis for determining many of the variables, such as Operations and Maintenance, and Depreciation. However, the general trend of development will not be changed by this reconsideration of generating facilities and it should not be necessary to re-compute all values which would be affected. The net change will be small and have no significant effect on the viability of the project.

We recommend that AID support for the project be responsive to the new cost as developed in this addendum to the report.