

TITLE

RURAL ELECTRIFICATION

By

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TABLE OF CONTENTS

I	Title
II	Introduction
III	History of Rural Development
IV	Method of Financing Rural Lines
V	My Plan
VI	Calculations
VII	Conclusions
VIII	Approval

INTRODUCTION

The vast strides of the electrical industry, in whom, development, has brought us into the age when the use of electrical appliances has become more nearly a necessity than a convenience, hence the thought today is turned toward an expansion of the field to include the rural section.

It is the aim of this paper to analyze the cost of extending service into this new territory and to develop a plan of financing the investments so that the service may be had on a sound economic basis.

This plan of financing is the result of a study of rural line operating cost as tabulated on the following pages.

HISTORY OF RURAL DEVELOPMENT

Power supply has always played an important part in the development of our country. The early pioneers recognized the value of adequate power supply to a community. In those days the location of water power sites on small streams many times determined the location of new settlements. The community fortunate enough to have a water power with which to operate a grist mill and local factory was envied by all others.

These industries drew business from great distances and caused such communities to develop, grow, and prosper, and many developed into thriving cities. As communities grew the local water powers did not often have sufficient capacity to meet the demands, and it was then necessary to supply auxiliary power by steam engines.

Improvements in steam engines, the building of steam turbines, and later the development of local electric public utilities, made it possible to supply power in the large cities at very much less cost than in the small cities, and this was often done at the expense of smaller communities where an adequate amount of low cost power was not available. During this period many thriving small communities were abandoned, others decreased in population, and still others barely held their own.

Then began the great expansion program of public utilities whereby large efficient generating stations were built and connected by transmission lines, first to the larger cities, later to the smaller cities, and recently to villages.

As a result of this development, power at relatively low cost is now being supplied to a very large number of small villages and rural communities. Now that these communities have an adequate power supply they are again in position to bid for new factories and properly take care of industries now located within their boundaries and should experience a very prosperous growth.

The Alabama Power Company, appreciating the importance of the rural development, and their need for electrification, has for several years been keenly interested in extending electric service to the farmers of the state. Its first rural line was built in 1920, to serve a group of farmers along Whitesburg Pike, Maddison County. On January 1, 1924 the Company adopted a definite rural electrification program in cooperation with the Alabama Polytechnic Institute at Auburn. This program consisted of three years experimental play to determine how Alabama farmers could satisfactorily use electricity. The results obtained from this experimental work were so satisfactory that the Company has steadily enlarged its program and increased its facilities for rural electric developments.

On May 1, 1928 the Company was operating 145 rural lines in 168 communities in 42 counties of the state. At that time 47 other rural lines were approved and under construction and 29 additional lines were under consideration.

From the rural lines that were in operation on May 1, there were 4,155 customers being served and such service had required the construction of 578.7 miles of lines. Lines approved and under construction on May 1, added 178.7 miles and increased the total number of customers to over 6,000.

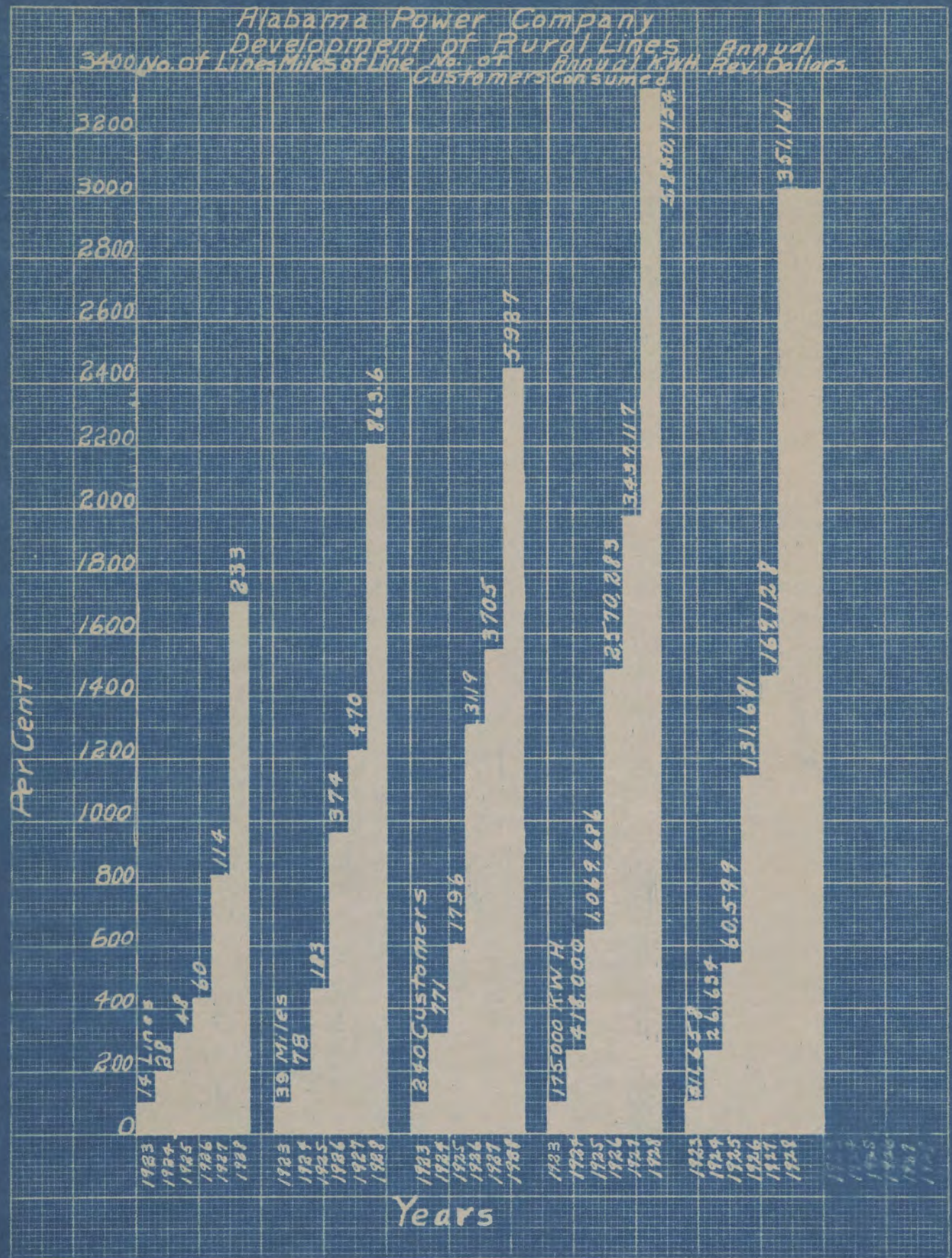
At the end of 1927 the company's rural lines were supplying electricity at the rate of 3,437,117 kilowatt hours per year. Of this amount rural community enterprises were using 1,361,491 kilowatt hours and 2,079,626 kilowatt hours were being used for farm and household purposes.

Pennsylvania Electric Company, in 8 months of 1927, built 547 miles of rural lines, adding a total of 12,500 rural customers at a cost of \$1,577,843. In 8 months of 1928 they built 1,138 miles of rural lines, adding a total of 12,590 customers at a cost of \$2,141,187.

On January 1, 1926 there were 8,500 farms being served by the Wisconsin Power Companies. On July 1, 1928, this number of farms had been increased to 18,156. This represents an increase of 9,656 farms (113.7%) during the $1\frac{1}{2}$ years.

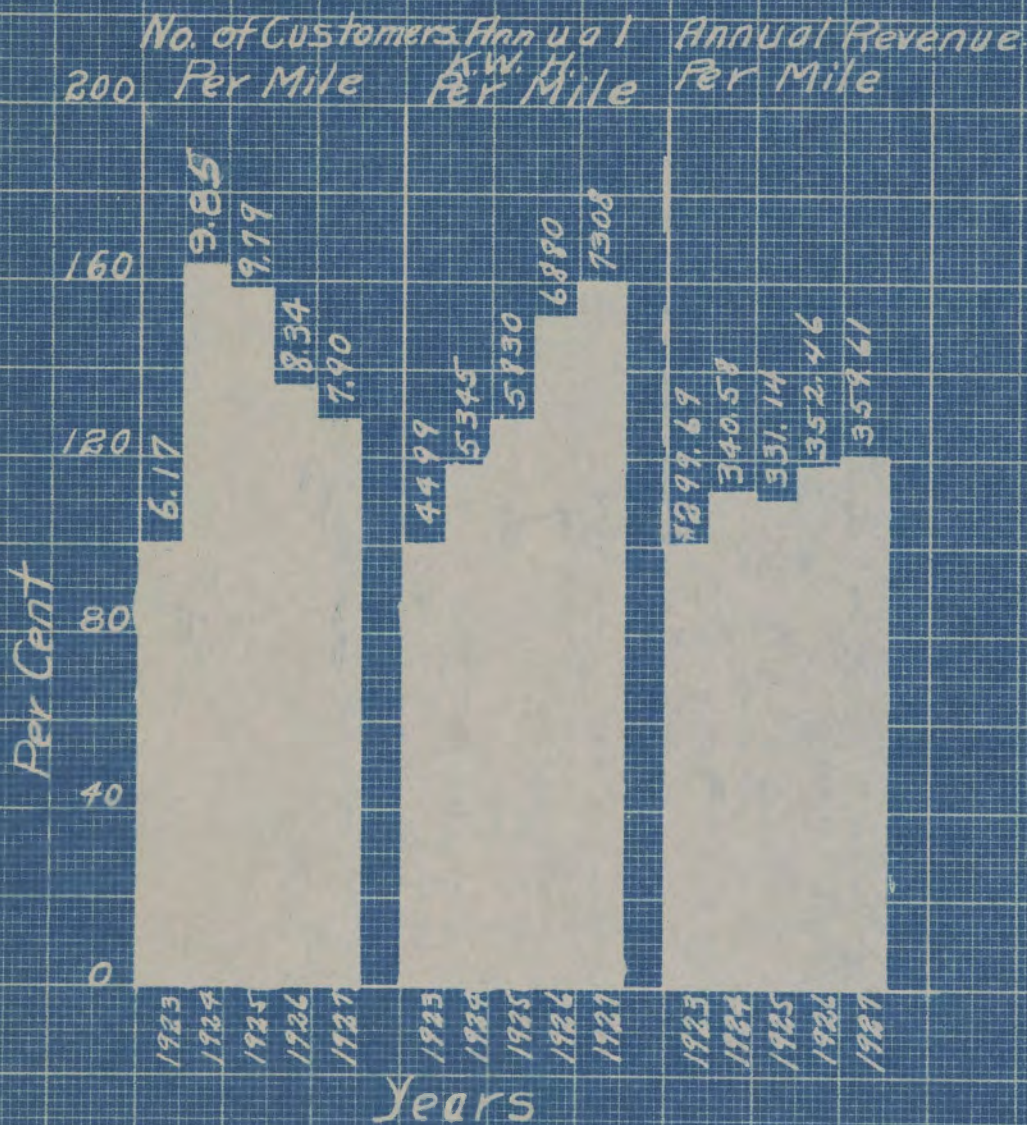
The Southeastern Division of the N.E.L.A. made a survey which showed that at the beginning of 1928, 20,485 rural customers were being served in the six states of the Southeastern Division. These customers were served from 2,321 miles of rural lines - an average of 8.9 customers per mile. During the year 1927, 3,861 rural customers were added, an increase of 23.6% in the number of customers served.

The operating companies of the Southeastern Power and Light Company of 1928 built 182 rural lines, with a total of 566 miles of lines to serve 2,991 rural customers. These additions represent an increase of 117% in the number of lines, 96% in the miles of lines, and 83% in the number of rural customers.



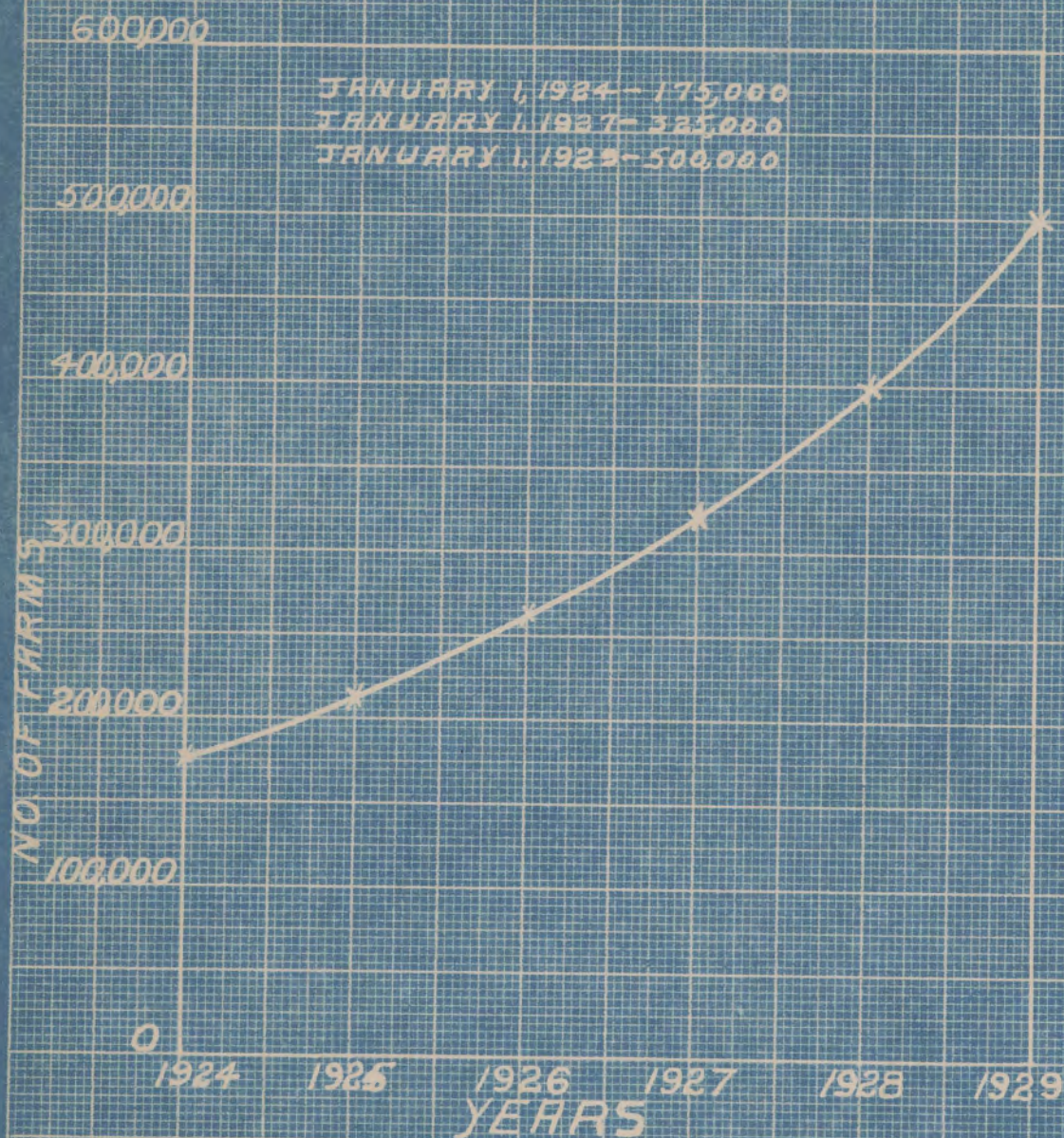
ALABAMA POWER COMPANY

Development Per Mile On Rural Lines



ESTIMATED-NUMBER-OF-FARMS
IN-THE-UNITED-STATES-HAVING
HIGHLINE
ELECTRIC-SERVICE

JANUARY 1, 1924 - 175,000
JANUARY 1, 1927 - 325,000
JANUARY 1, 1929 - 500,000



METHODS OF FINANCING RURAL LINES

There are many different methods used by public utilities in financing rural lines.

1. The Alabama Power Company takes upon themselves the responsibility of financing their own rural lines and billing the customer for cost of same through monthly payments.

Electricity under this rate is available for lighting, heating, cooking, farm refrigeration, and other power, or any combination of these and the total consumption measured through one meter.

Under this rate the cost of electric service to the customer is made up of a monthly rural line charge which is based on the number of customers per mile of line and on each customers connected load plus an energy charge for the kilowatt hours actually consumed, as shown by meter. The rural line charge for the first kilowatt of connected load is divided into 4 classes as follows:- over 15 and less than 20 customers per mile - \$1.75 per month; Over 15 and not more than 15 customers per mile - \$2.25 per month; over 5 and not more than 10 customers per mile - \$3.00 per month; 5 customers or less per mile - \$4.00 per month.

For each additional kilowatt of connected load the rural line charge is increased \$1.50 per month and the rate provides that the total contracted load by all customers shall be a minimum of 10 kilowatts per mile of line.

The energy charge for current consumed, as shown by meter readings, is:-

5 $\frac{1}{2}$ cents per KWH for the first 50 KWH consumed per month; plus 3 $\frac{1}{2}$ cents per KWH for the next 950 KWH consumed per month; plus 2 $\frac{1}{2}$ cents per KWH for all over 1,000 KWH consumed per month.

Under this rate the customer is not required to furnish any part of the cost of building or maintaining the rural lines, or to put up any money whatsoever, except for such service lines or wiring which is done on his premises. The company usually supplies 2 poles on private property, to reach the customer's outlet. The expense of any further extension on the customer's property is born by the customer.

As noted above, the customer is not required to furnish any part of the cost of constructing a rural line but he may do so under this rate in lieu of the monthly line charge, deposit with the company an amount equal to \$150.00 for each \$1.00 of monthly rural line charge as determined above. If such deposit is made, it will be refunded to the customer in full, without interest, at the termination of his contract and in no instance, less than one year from the beginning of service.

2. The Wisconsin Power and Light Company follows a somewhat similar plan as the Alabama Power Company. However there is a limit to the company's expense per customer on rural lines.

When the analysis of the proposed rural extension indicates that electric service is justified from both the company's and customer's standpoint, the company will execute with each prospective rural customer a contract setting forth the rates, terms, and conditions of service in a substantial form as explained hereto.

If the number of contracts signed is such that the estimated cost of the extension will not exceed an average of \$400.00 per customer the company will proceed to construct the extension at its own expense.

If the cost of the extension is estimated to be more than an average of \$400.00 per customer, the amount by which said costs are estimated to exceed the \$400.00 average shall be contributed by the customer; one-half of such contribution shall be paid to the company when the poles are set and the remainder shall be paid when service is available. The amount of the second payment shall be adjusted on the basis of the actual cost of construction above an average of \$400.00 per customer.

If, within five years from date when service is first established on a rural extension, additional rural customers are connected to the extension, either directly, or by any branch from or addition to the extension, the cost of connecting them will be included in a new determination of the average cost per customer whenever such inclusion will lower the average cost per customer already served by the extension. In such cases the new customer shall pay the company and the company shall refund to the original customers such sums as will equalize all the customer's investment in the extension.

Each rural customer is required to pay monthly bills consisting of a service charge plus an energy charge, as follows:-

(a) Service Charge:-

<u>Transformer capacity required</u>	<u>Monthly Service charge</u>
Not more than $1\frac{1}{2}$ Kva -----	\$3.00
Over $1\frac{1}{2}$ Kva and not more than 3 Kva -----	\$4.00
Over 3 Kva and not more than 5 Kva -----	\$5.00
Over 5 Kva and not more than $7\frac{1}{2}$ Kva -----	\$6.00
Over $7\frac{1}{2}$ Kva and not more than 10 Kva -----	\$7.00

(b) Energy Charge:-

For the first 50 KWH used per month -----	$7\frac{1}{2}\%$ per KWH
For all in excess of 50 KWH used per month -----	$3\frac{1}{2}\%$ per KWH

A discount of $\frac{1}{2}\%$ per KWH will be allowed on any bill paid fourteen days from the date of the bill.

The service charge shall constitute the minimum monthly bill.

MY PLAN

In designing the rural development plan on a basis that will be worth the consideration of any distributing company it is first necessary to have the investment of the organization protected, but still give the rural consumer a plan that he can afford to use on an economical basis.

The plan of allocating the cost of service to the individuals according to the requirement in terms of connected load, or demand load, is the most sound method from a theoretical distribution standpoint, but in many cases the communities to be served have prospective consumers whose financial conditions prohibit their acceptance of service under such allocations - example - (5 customers per mile each have a minimum of \$5.03 per month), and these same communities have another group who can justify a greater use of electricity than the average, as allocated, will require of them. However, it will be a benefit to the better class to have such help as the less prosperous are able to give in order to obtain the revenue necessary to warrant the building of a line.

When a company builds one mile of rural line that will serve an average density of 5 customers per mile, they have invested in that line \$148. In order to protect the company's investment this one mile of line must pay a monthly revenue (less the KWH used) of \$25.15. To allocate this monthly charge among the five customers would necessarily mean that some prospective consumers, because of their financial conditions, would be unable to become a customer. Two of these customers are financially able to guarantee \$8.00 each per month; one other customer will guarantee \$4.50 per month, leaving a total of \$2.32 to be paid by each of the remaining customers. This community is now able to secure electric service without imposing any undue hardships on any of its members.

The operating companies can secure the capital for the expenditure much more easily than can the petitioning group, and the group being relieved of the burden of line financing have available more cash to purchase electrical equipment to increase their consumption of electricity and thereby receive greater benefits from the service.

Due to the fact that the operating company need protection of its investment where the petitioners cannot easily afford the cash outlay this plan has been worked out whereby the consumers would guarantee sufficient revenue to protect the operating company's investment.

These customers minimum monthly bill will be their monthly guarantee. This plan will put electric service in reach of more rural sections, for the consumers could absorb their guarantee monthly with the appliances they could purchase with the money that would be required to finance the line, thereby getting a greater return in work and conveniences. This plan of letting each individual guarantee whatever portion of the revenue he could bear would be another means of community cooperation and result in better organized communities with a general increase in the standards of living.

The amount of the average monthly guarantee per customer depends upon whether or not this line was built to serve .5 KW D.L. or 3.0 KW D.L. The average monthly guarantee per customer for one mile of line, 5 customers, .5 KW demand load amounts to \$5.03, while that same mile of line to serve 5

customers, 3.0 KW demand load must pay an average monthly bill per customer of \$6.73.

If one mile of line is built to serve 5 residential lighting consumers and at the end of one year 3 of these consumers install electric ranges then the operating company must install additional equipment in order to serve the increased load. Under these conditions there must be an additional guarantee, in order to protect the operating company's investment, of \$5.12 per month. It is unfair to the smaller consumer to allocate this additional guarantee. therefore, the average monthly guarantee of the 3 range customers should be increased by \$1.71 per month. Due to the installation of the ranges these customers have additional means of absorbing their guarantee. In order to serve these customers the operating company must spend, in addition to the present line, \$341.55.

The result of this study is tabulated on Figure No. 14.

Example:- Original Line

5 lighting customers - average monthly guarantee ----- \$5.03

At end of one year;-

2 lighting customers - average monthly guarantee ----- \$5.03

3 range customers - average monthly guarantee ----- \$6.73

Figure 4

STUDY OF RURAL LINE OPERATING COST
(Residential)
5 Customers per Mile - .5 KW D.L.

Article	Investment Company	Customer Operating Expense	Taxes % Amount	Maintenance & Operation % Amount	Insurance % Amount	R. & R. % Amount	Return % Amount	Yearly Total % Amount	Per Monthly Amount
Line Cost									
\$800.00 Per Mile	\$ 160.00		1 \$1.60	4 \$6.40	1 \$1.60	4 \$6.40	8 \$12.80	18 \$28.30	
Transformer Installation									
1 - $\frac{1}{2}$ KVA Inst.	75.00		1 0.75	4 3.00	1 0.75	4 3.00	8 6.00	18 13.50	
Service Wires Inst.	6.65		1 0.07	4 0.27	1 0.07	4 0.27	8 0.54	18 1.19	
Meter Installation	10.00		1 0.10	4 0.40	1 0.10	4 0.40	8 0.80	18 1.80	
System Investment									
\$120.00 Per KW D.L.									
\$120.00 x .5 x .5									
(Div. Fac. 2)	30.00		1 0.30	4 1.20	1 0.30	4 1.20	8 2.40	18 5.40	
		\$ 9.65							
Total Fixed Cost	\$ 281.65	\$ 9.65	\$2.82	\$11.27	\$2.82	\$11.27	\$22.54	\$59.84	\$4.99

Energy

Average cost energy at
metered source 7.5 mils
per KWH.

Rural Dist. Loss and
Transformer loss

Use @ 1.25¢

20 KWH per month

Total monthly bill for 20 KWH

Average cost per KWH delivered

.25

\$5.24

26.2¢

Figure 5

STUDY OF RURAL LINE OPERATING COST
(Residential)
(Range, Refrigerator, Pump & Misc. Power)
5 Customers per mile 3.0 KW D.L.

Article	Investment Company	Customers Operating Expense	Taxes % Amount	Maintenance % Operation % Amount	Insurance % Amount	R. & R. % Amount	Return % Amount	Yearly Total % Amount	Per Monthly Amount
Line Cost \$800.00 Per Mile	\$160.00		1 \$1.60	4 \$6.40	1 \$1.60	4 \$6.40	8 \$12.80	18 \$28.30	
Transformer Installation L - 3 $\frac{1}{2}$ KVA.	125.00		1 1.25	4 5.00	1 1.25	4 5.00	8 10.00	18 22.50	
Service Wires Inst.	6.00		1 0.08	4 0.32	1 0.08	4 0.32	8 0.64	18 1.44	
Meter Installation	12.50		1 0.13	4 0.50	1 0.13	4 0.50	8 1.00	18 2.27	
System Investment \$120.00 Per KW D.L. \$120.00 x 3.0 x .25 (Div. Fac. 4)	90.00		1 0.90	4 3.60	1 0.90	4 3.60	8 7.20	18 16.20	
		\$9.65							
Total Fixed Cost.	\$495.50	\$9.65	\$3.96	\$15.82	\$ 3.96	\$15.82	\$31.64	\$ 80.36	\$6.69

Energy

Average Cost energy
at metered source.
7.5 Mills per KWH.
Rural District Loss &
Transformer Loss.
Use @ 1.25¢
160 KWH per month.
Total monthly bill for 160 KWH.
Average Cost per KWH delivered.

\$2.00
\$8.69
5.43¢

Figure 6

STUDY OF RURAL LINE OPERATING COST
(Residential)

1-Mile line, Average Density of 5
Customers per mile.

Demand Load .5 KW

Article	Investment Company	Customers Operating Expense	Taxes % Amount	Maintenance & Operation % Amount	Insurance % Amount	R. & R. % Amount	Return % Amount	Yearly Total % Amt.	Per Month Amount.
Line Cost \$300.00 Per Mile	\$300.00	1	1 \$8.00	4 \$32.00	1 \$8.00	4 32.00	8 \$64.00	18 144.00	
Transformer Inst. 5 - $\frac{1}{2}$ KVA Inst.	375.00		1 3.75	4 15.00	1 3.75	4 15.00	8 30.00	18 67.50	
Service Wire Installed	33.25		1 0.33	4 1.33	1 0.33	4 1.33	8 2.66	18 5.98	
Meter Installation	50.00		1 0.50	4 \$2.00	1 0.50	4 2.00	8 4.00	18 9.00	
System Investment \$120.00 per KW D.L. \$120.00 x 2.5 x .5 (Div. Fac. 2)	150.00		1 1.50	4 6.00	1 1.50	4 6.00	8 12.00	18 27.00	
		\$48.25						48.25	
TOTAL FIXED Cost.	\$1408.25	\$48.25	13.88	56.33	13.88	56.33	122.66	301.74	25.15

Figure 7

STUDY OF RURAL LINE OPERATING COST

(Residential)

1-Mile line, Average density of 10 Customers per mile.

Demand Load .5 KW.

Article	Investment Company	Customers Operating Expense	Taxes % Amount	Maintenance & Operated % Amount	Insurance % Amount	R. & R. % Amount	Return % Amount	Yearly Total % Amount	Per Monthly Amount
Line Cost									
\$800.00 Per Mile	\$800.00		1 8.00	4 32.00	1 8.00	4 32.00	8 64.00	18 144.00	
Transformer Installation									
10- $\frac{1}{2}$ KVA. Inst.	750.00		1 7.50	4 30.00	1 7.50	4 30.00	8 60.00	18 135.00	
Service Wire Installed	66.50		1 0.67	4 2.66	1 0.67	4 2.66	8 5.32	18 12.97	
Meter Installation	100.00		1 1.00	4 4.00	1 1.00	4 4.00	8 8.00	18 18.00	
System Investment									
\$120.00 per KW. D.L.									
\$120.00 x 5 X .5									
(Div. Fac.2)	300.00		1 3.00	4 12.00	1 3.00	4 12.00	8 24.00	18 54.00	
		96.50						96.50	
Total Fixed Charge	\$2016.50	96.50	20.17	80.66	20.17	80.66	161.32	460.47	3837

Figure 8

STUDY OF RURAL LINE, OPERATING COST.
 (Residential)
 1-Mile line, Average density, 15 Customers per mile
 Demand Load .5 KW

Article	Investment Company	Customers Operating Expense	Taxes % Amount	Maintenance & Operation % Amount	Insurance % Amount	R. & R. % Amount	Return % Amount	Yearly Total % Amount	Per Monthly Amount
Line Cost \$300.00 per Mile	\$300.00		1 8.00	4 32.00	1 8.00	4 32.00	8 & 64.00	18 144.00	
Transformer Installation 15- $\frac{1}{2}$ KVA Inst.	1125.00		1 11.25	4 45.00	1 11.25	4 45.00	8 90.00	18 202.50	
Service Wires Installed	99.75		1 1.00	4 3.99	1 1.00	4 3.99	8 7.98	18 17.96	
Meter Installation	150.00		1 1.50	4 6.00	1 1.50	4 6.00	8 12.00	18 27.00	
System Investment \$120.00 per KW. D.L. \$120.00 x 7.5 x .5 (Div. Fac. 2)	450.00		1 4.50	4 18.00	1 4.50	4 18.00	8 36.00	18 81.00	
		144.75						144.75	
Total Fixed Charge	\$2624.75	\$144.75	\$26.25	\$104.99	\$26.25	\$104.99	\$209.98	\$617.21	\$51.43

Figure 9

STUDY OF RURAL LINE, OPERATING COST
(Residential)
1-Mile line, average density 20 Customers per mile
Demand Load .5 KW.

Article	Investment Company	Customers Operating Expense	Taxes % Amount	Maintenance & Operation % Amount	Insurance % Amount	R. and R. % Amount	Return % Amount	Yearly Total % Amt.	Per Month Amount
Line Cost									
\$800.00 per Mile	\$800.00		1 8.00	4 32.00	1 8.00	4 32.00	8 64.00	18 144.00	
Transformer Ins.									
20- $\frac{1}{2}$ KVA. Inst.	1500.00		1 15.00	4 60.00	1 15.00	4 60.00	8 120.00	18 270.00	
Service Wire Inst.	133.00		1 1.33	4 5.32	1 1.33	4 5.32	8 10.64	18 23.94	
Meter Installed	200.00		1 2.00	4 8.00	1 2.00	4 8.00	8 16.00	18 36.00	
System Investment									
\$120.00 per KW. D.L.									
\$120 x 10 x .5									
(Div. Fac. 5)	600.00		1 6.00	4 24.00	1 6.00	4 24.00	8 48.00	18 108.00	
		\$193.00						\$193.00	
Total Fixed Charge	\$3233.00		\$32.33	\$129.33	\$32.33	\$129.33	\$258.64	\$774.94	648

Figure 10

STUDY OF RURAL LINE, OPERATING COST
(Residential)
Range, Refrigerator, Pump and Misc. Power
1-Mile line, 5 Customers per mile.
Demand Load 3.0 KW.

Article	Investment Company	Customers Operating Expense	Taxes % Amount	Maintenance & Operation % Amount	Insurance % Amount	R. & R. % Amount	Return % Amount	Yearly Total % Amount	Per Month Amount
Line Cost \$800.00	\$800.00		1 8.00	4 32.00	1 8.00	4 32.00	8 64.00	18 144.00	
Transformer Inst. 5-3 $\frac{1}{2}$ KVA.	625.00		1 6.25	4 25.00	1 6.25	4 25.00	8 50.00	18 112.50	
Service Wires Ins.	40.00		1 0.40	4 1.60	1 0.40	4 1.60	8 3.20	18 7.20	
Meter Installation	62.50		1 0.63	4 2.50	1 0.63	4 2.50	8 5.00	18 11.25	
System Investment \$120.00 per KW D.L. \$120.00 x 15 x .25. (Div. Fac. 4)	450.00		1 4.50	4 18.00	1 4.50	4 18.00	8 36.00	18 81.00	
		\$48.25						\$48.25	
Total Fixed Charge	\$1977.50	\$48.25	\$19.78	\$79.10	\$19.78	\$79.10	\$158.20	\$404.20	\$33.77

Figure 11

STUDY OF RURAL LINE OPERATING COST.
(Residential)
(Range, Refrigerator, Pump & Misc. Power)

1-Mile line, 10 Customers per mile.

Demand Load 3.0 KW

Article	Investment Company	Customers Operating Expense	Taxes % Amount	Maintenance & Operation % Amount	Insurance % Amount	R. & R. % Amount	Return % Amount	Yearly Total % Amount	Per Monthly Amount
Line Cost									
\$800.00 per Mile	\$800.00		1 8.00	4 32.00	1 8.00	4 32.00	8 64.00	18 144.00	
Transformer Inst.									
10-3 $\frac{1}{2}$ KVA. Inst.	1250.00		1 12.50	4 50.00	1 12.50	4 50.00	8 100.00	18 225.00	
Service Wires Inst.	80.00		1 0.80	4 3.20	1 0.80	4 3.20	8 6.40	18 14.40	
Meter Installation	125.00		1 1.25	4 5.00	1 1.25	4 5.00	8 10.00	18 22.50	
System Investment									
\$120.00 per KW. D.L.									
\$120.00 x 30 x .25 (Div. Fac. 4)	900.00		1 9.00	4 36.00	1 9.00	4 36.00	8 72.00	18 162.00	
		96.50						96.50	
Total Fixed Cost	\$155.00	96.50	31.55	126.20	31.55	126.20	252.40	664.40	55.37

Figure 12

STUDY OF RURAL LINE OPERATING COST.

(Residential)

(Range, Refrigeration, Pump & Misc. Power)

Demand Load 3.0 KW

[illegible]

Figure #13

STUDY RURAL LINE OPERATING COST.
(Residential)
Range, Refrigeration, Pump & Misc. Power)
Demand Load 3.0 KW

Article	Investment Company	Customers Operating Expense	Taxes % Amount	Maintenance & Operation % Amount	R. & R. % Amount	Return % Amount	Insurance % Amount	Yearly Total % Amount	Per monthly Amount
Line Cost									
\$300.00 Per Mile	\$300.00		1 8.00	4 32.00	4 32.00	8 64.00	1 8.00	18 144.00	
Transformer Inst.									
20-3 $\frac{1}{2}$ KVA Inst.	2500.00		1 25.00	4 100.00	4 100.00	8 200.00	1 25.00	18 450.00	
Service Wires Inst.	160.00		1 1.60	4 6.40	4 6.40	8 12.80	1 1.60	18 28.80	
Meter Installation	250.00		1 2.50	4 10.00	4 10.00	8 20.00	1 2.50	18 45.00	
System Investment									
\$120.00 per KW. D.L.									
\$120.00 x 60 x .25.									
(Div. Fac.4)	1800.00		1 18.00	4 72.00	4 72.00	8 144.00	1 18.00	18 324.00	
		\$193.00						193.00	
Total Fixed Charge	\$5510.00							\$1184.80	\$98.67

Figure 14

STUDY OF RURAL LINE OPERATING COST.
(Residential)
(Range, Refrigeration, Pump & Misc. Power)
1-Mile line, 20 Customers per Mile.

[illegible]

RESIDENTIAL LIGHTING

DEMAND LOAD-5 K.W.

NUMBER OF CUSTOMERS PER MILE

20

15

10

5

0

5-CUSTOMERS - \$5.00
10-CUSTOMERS - \$3.84
15-CUSTOMERS - \$3.40
20-CUSTOMERS - \$3.23

P.D.B.

1.00

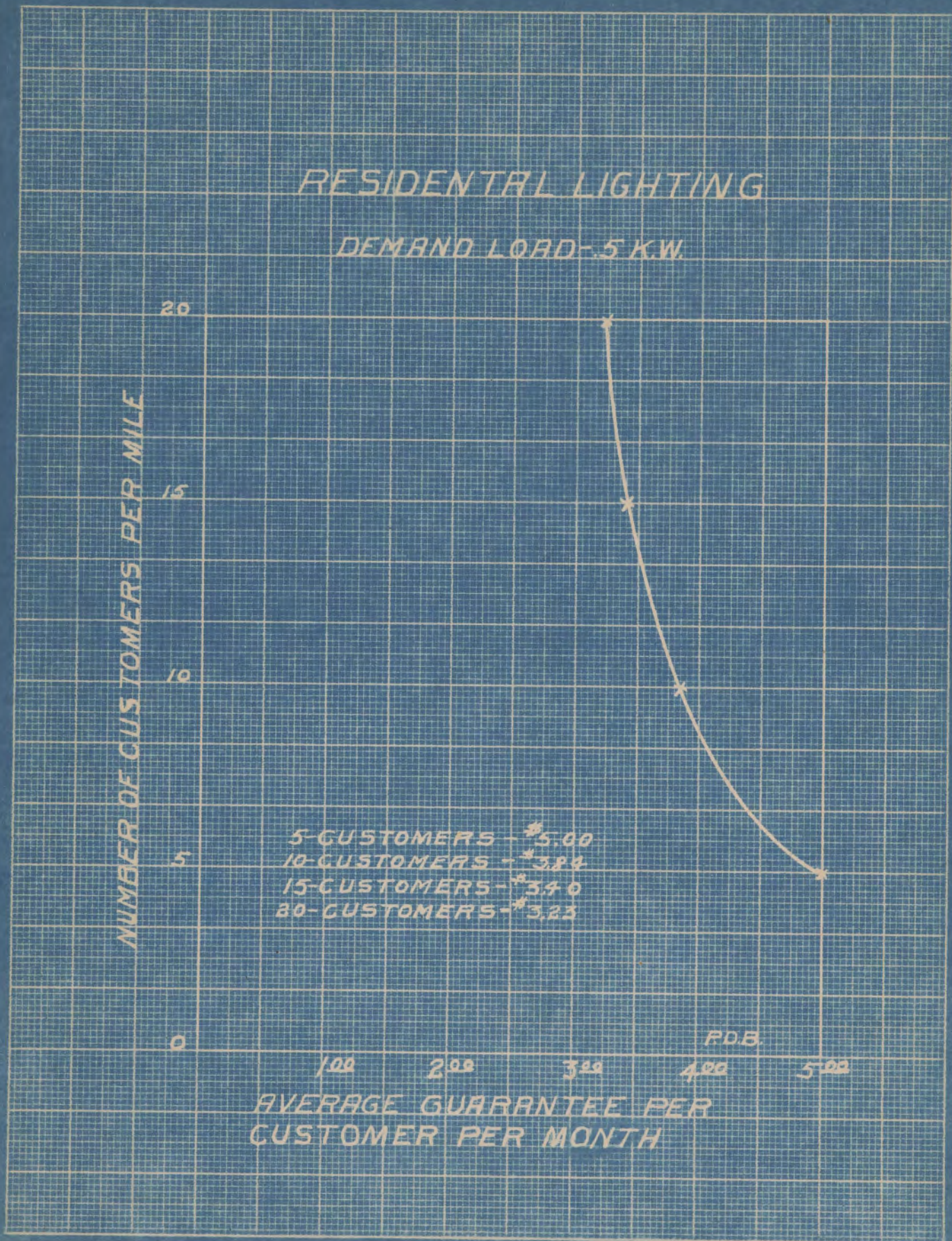
2.00

3.00

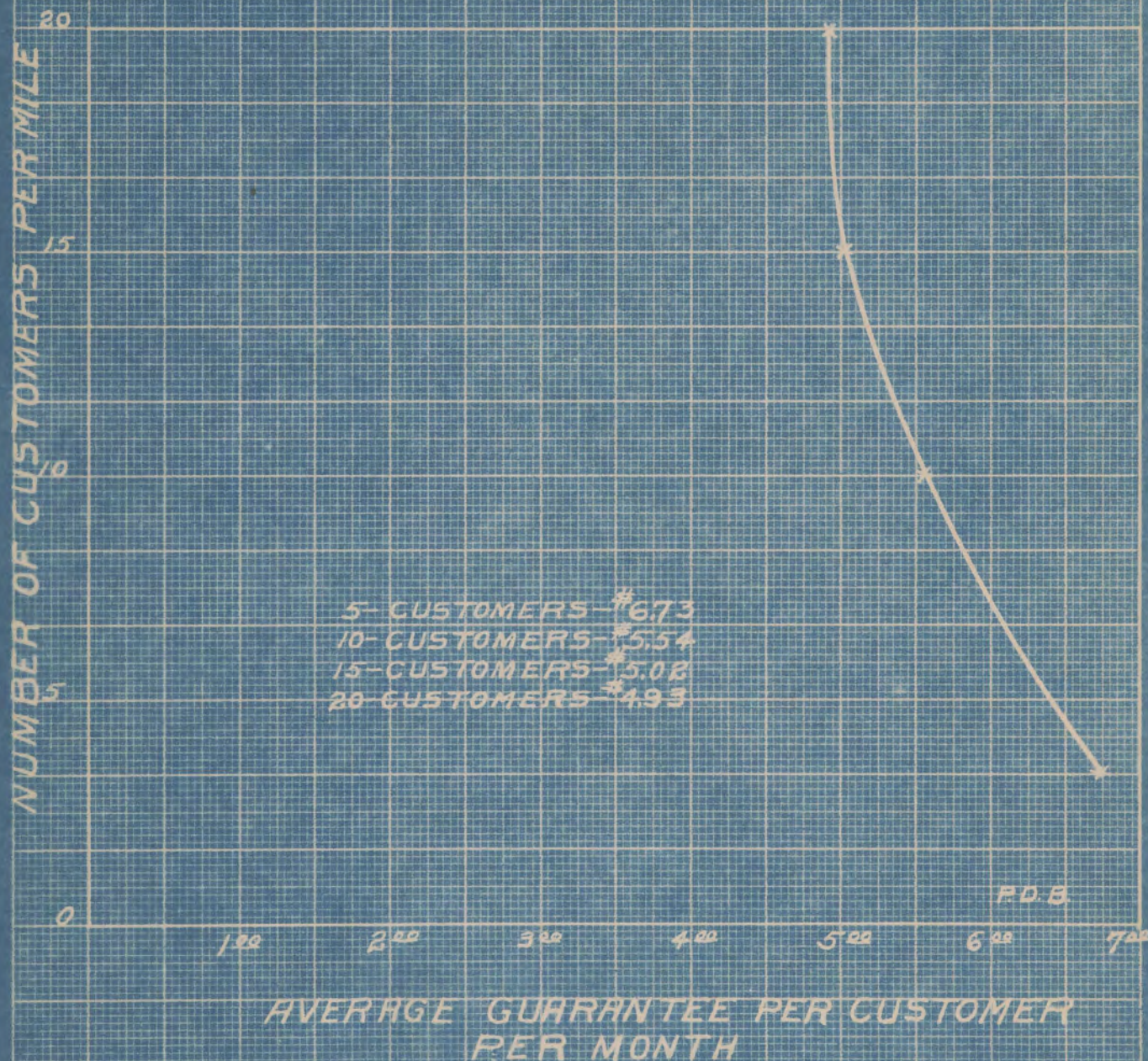
4.00

5.00

AVERAGE GUARANTEE PER
CUSTOMER PER MONTH



RESIDENTIAL COOKING AND LIGHTING DEMAND LOAD - 3.0 KW.



DATA SHEET

CLASS (Lighting)	Customer Per Mile	Line Investment	Operating Cost Per Month	Average Guarantee Per Cost Per Month.
.5 KW	5	\$1408.25	\$25.15	\$5.03
.5 KW	10	\$2016.50	\$38.37	\$3.84
.5 KW	15	\$2624.75	\$51.43	\$3.40
.5 KW	20	\$3233.00	\$64.58	\$3.23
(Lighting & Cooking)				
3.0 KW	5	\$1977.50	\$33.77	\$6.73
3.0 KW	10	\$3155.00	\$55.37	\$5.54
3.0 KW	15	\$4332.50	\$75.38	\$5.02
3.0 KW	20	\$5510.00	\$98.67	\$4.93

CONCLUSIONS

The history of rural development and methods of financing rural lines, as recorded in this thesis, is material that was secured from the operating companies who are interested in rural development.

The plan, as recorded, is a detailed study of rural line operating cost. This study covers the installation of one mile of line to serve an average density of 5, 10, 15, and 20 customers per mile with a demand load of .5 KW and 3.0 KW. The curves show the relation between the average guarantee per customer per month and the number of customers per mile.

APPROVAL.

The foregoing thesis is hereby approved as a creditable study of an engineering subject, carried out and presented in a manner sufficiently satisfactory to warrant its acceptance as a prerequisite to the degree for which it has been submitted. It is to be understood that by this approval the undersigned does not necessarily endorse or approve any statement made, opinions expressed, or conclusions drawn therein, but approves the thesis only for the purpose for which it is submitted.

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