DEPARTMENT OF COMMERCE AND LABOR
BUREAU OF THE CENSUS
S. N. D. NORTH, DIRECTOR

BULLETIN 99

ELECTRICAL INDUSTRIES OF PORTO RICO

1907

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BULLETINS OF THE PERMANENT CENSUS.

1. Geographical distribution of population.
2. Cotton ginned in the United States, 1899 to 1902.
*3. Street and electric railways.
4. A discussion of increase of population.
*5. Central electric light and power stations.
6. Mineral industries of Porto Rico.
7. Estimates of population of the larger cities: 1901, 1902, 1903.
8. Negroes in the United States.
9. Mines and quarries.
*10. Cotton ginned in the United States, 1899 to 1903.
11. Municipal electric fire alarm and police patrol systems.
12. The executive civil service of the United States.
13. A discussion of age statistics.
14. Proportion of the sexes in the United States.
15. A discussion of the vital statistics of the Twelfth Census.
16. Irrigation in the United States: 1902.
17. Telephones and telegraphs: 1902.
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20. Statistics of cities, population of over 25,000: 1902 and 1903.
21. Commercial valuation of railway operating property: 1904.
22. Proportion of children in the United States.
23. Census statistics of teachers.
24. Insular and municipal finances in Porto Rico, 1902–3.
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30. ——— Arizona, Indian T., New Mexico, and Oklahoma.
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NOTE.—Bulletins in this list, except those marked with an asterisk (*), may be obtained upon application to the Director of the Census.

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LETTER OF TRANSMITTAL.

DEPARTMENT OF COMMERCE AND LABOR,
BUREAU OF THE CENSUS,
Washington. D. C., April 19, 1909.

SIR:

I have the honor to transmit herewith Census Bulletin 99, containing a compilation of the statistics for and a history of the electrical industries of Porto Rico. This bulletin forms a part of the census of street and electric railways, central electric light and power stations, and telephone and telegraph business, which is taken every fifth year in conformity with the requirements of the act of Congress approved June 7, 1906. As the reports for this census which relate to continental United States contain a full description of census methods and the limitations of the statistics, such details are not given in this bulletin.

The statistics relate to the year 1907 and are the results of the first complete census that has ever been taken of the electrical industries of Porto Rico. This census has been made and the results compiled under the supervision of Mr. William M. Steuart, chief statistician for manufactures. The historical portion of the bulletin was prepared by Mr. William F. Willoughby, secretary of Porto Rico.

Very respectfully,

S. N. D. North

Director.

Hon. CHARLES NAGEL,
Secretary of Commerce and Labor.

ELECTRICAL INDUSTRIES OF PORTO RICO.

STATISTICS.

The census of electrical industries of 1902 was the first to include statistics for Porto Rico; but the enumeration was evidently defective, as no reports were secured for telephone or electric light and power companies, although such concerns were in operation at that time. The totals for that census, therefore, can not fairly be compared with those for the census of 1907 to show the extent of the increase.

The statistics presented in this report form a part of the regular census of the electrical industries which relates to the year ending December 31, 1907, and reference should be made to the reports for that year on Street and Electric Railways, Central Electric Light and Power Stations, and Telephones and Telegraphs in the United States for information concerning census methods, the character of the information collected, and the limitations surrounding the use of the statistics. The census covers all electric public service companies, but does not include isolated electric plants or telephone lines connecting different rooms or departments of the same building or institution and having no connection for communication with the public.

The electrical enterprises in Porto Rico are not extensive, and apparently have not developed to the extent justified by the population and business interests. Reports were received for 11 enterprises that were in operation during 1907, and the statistics for them are summarized in Table 1.

TABLE 1.—*Electrical industries of Porto Rico: 1907.*

	Total.	Telegraphs.[1]	Telephones.	Central electric light and power stations.	Street and electric railways.
Number of companies	11	1	3	4	3
Total cost of plant (construction and equipment)	$2,373,258	.....	$255,041	$146,705	$1,971,512
Capital stock, authorized, par value	$982,500	.....	$198,000	$88,100	$696,400
Capital stock, outstanding, par value	$880,500	.....	$131,000	$53,100	$696,400
Dividends on stock	$2,700	.....	$2,700	.....	.....
Funded debt, authorized, par value	$1,536,786	.....	$88,000	.....	$1,448,786
Funded debt, outstanding, par value	$1,020,186	.....	$85,400	.....	$934,786
Interest on funded debt	$57,706	.....	$5,202	.....	$52,504
Total income	$663,031	$59,226	$79,055	$143,014	$381,736
Total expenses (including taxes and fixed charges)	$497,124	$51,945	$55,150	$86,905	$303,124
Salaried employees:					
Number	59	4	16	16	23
Salaries	$61,983	$4,800	$11,326	$16,217	$29,640
Wage-earners:					
Average number	467	128	92	35	212
Wages	$142,467	$36,301	$23,423	$18,922	$63,821
Steam engines and turbines:					
Number	15	.....	.....	7	8
Horsepower	3,825	.....	.....	1,050	2,775
Water wheels:					
Number	3	.....	.....	3	.....
Horsepower	256	.....	.....	256	.....
Dynamos:					
Number	25	.....	.....	15	10
Kilowatt capacity	2,942	.....	.....	972	1,970

[1] Includes statistics for telephones operated by the Bureau of Insular Telegraph.

As three of the enterprises for which statistics are given in this table are not incorporated companies, no capital stock was reported for them, and the amount of capitalization therefore has no relation to the totals for the other items which pertain to all 11 systems. The capitalization of the 8 incorporated companies, as represented by the par value of their outstanding stocks and bonds, amounted to $1,900,686. The same companies reported $2,345,374 as the cost of their plant and equipment up to the end of the year covered by the census reports. While the cost of the plant is the most important item determining the amount of capitalization, other factors not shown by the statistics must also be considered. The 5 companies that reported outstanding funded debt paid $57,706 in interest, at an average rate of 5.7 per cent. No capital nor cost of construction was reported for the governmental telegraph system.

The $663,031 reported for income includes income from the operation of the systems and also that derived from miscellaneous sources. The difference between this and the total expenses, $497,124, approximates the net income, which amounted to $165,907. The figures, however, have not been compiled with that degree of exactness which would justify their use to compute the exact net profit on the year's business.

The electrical industries gave employment to 526 salaried people and wage-earners, and paid out $204,450 in salaries and wages during the year. The number of employees reported is the average number required to operate the several systems during the entire year; but, as it is very difficult to obtain a true average for such a long period, it is not safe to divide this number into the total salaries or wages in order to ascertain the average per employee.

The 18 primary power engines and water wheels reported for the industry were capable of generating 4,081 horsepower, which was required to operate the 25 electric dynamos of 2,942 kilowatt capacity, or an equivalent of 3,944 horsepower. As the current required for the telephone and telegraph systems is obtained from primary and storage batteries, this generating equipment is confined to the electric railways and light and power plants.

TELEGRAPHS.

The only telegraph system is a combined telegraph and telephone system owned by the insular government and operated by the Bureau of Insular Telegraph, Department of the Interior of Porto Rico.

At the end of the fiscal year, June 30, 1907, the

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At the end of the fiscal year, June 30, 1907, the

equipment reported for this system comprised 484 miles of pole line and 774 miles of single wire; the number of stations was 128, and the messages transmitted were 216,489. For furnishing current to the lines there were 936 cells of primary and 2 cells of storage batteries distributed among the stations of the systems. It was reported, also, that there was on hand an incomplete two-kilowatt outfit for two wireless stations. The financial results of the operation of the system are indicated in Table 1. Of the wage-earners reported, the 70 operators—51 males and 19 females—received during the fiscal year $18,031 and $8,510, respectively, in wages.

TELEPHONES.

Reports were received from the Porto Rico General Telephone Company, the South Porto Rico Telephone Company, and the Compañía Anónima de la Red Telefónica de Ponce. While there were at least three local telephone systems in operation during 1902, no reports were received for that census. In addition to the commercial telephone companies, for which statistics are given in Tables 2 and 3, the insular telegraph system reported that on December 31, 1907, it had 175 telephones installed and 187 miles of wire given to the telephone business.

TABLE 2.—*Equipment—commercial telephone systems of Porto Rico: 1907.*

Number of companies	3
Miles of pole line for wires or cables	310
Miles of overhead cable	25
Miles of single wire	1,464
Number of exchanges	36
Telephones or stations, total	1,795
Subscribers'	1,770
Private branch exchange	7
Local pay and outlying toll	18
Telephones for exclusive use of company	14
Party lines:	
Number	24
Telephones	60
Farmer or rural lines:	
Number	1
Telephones	5
Estimated number of messages or talks, total	3,679,039
Exchange	3,567,955
Long distance and toll	111,084
Magneto (A) switchboards:	
Number	30
Drops or jacks, in use	1,785
Total number of drops or jacks, equipped or ready for use	2,220
Separate toll switchboards:	
Number	2
Drops or jacks, in use	43
Incoming trunk (B) switchboards, number	1
Main distributing frames, number	15
Hand magneto generators and power-driven ringers, number	30
Primary batteries, number of cells	162

Combining the number of telephones and miles of wire reported for the insular telegraph system as devoted to the telephone service gives 1,970 instruments and 1,651 miles of wire for the commercial telephone facilities of the island.

In addition to the 1,970 telephones operated by the commercial telephone companies and the insular telegraph system, there were 44 instruments on the government official telephone system, for communication between the different offices of the government and the several departments of the military post at San Juan, and there were also a number of telephones on systems maintained by the steam and electric railway companies for the operation of their roads. As before stated, the statistics do not include private telephone lines established and maintained for the exclusive use of individuals in communicating between different departments of their estates, or establishments.

TABLE 3.—*Financial data—commercial telephone systems of Porto Rico: 1907.*

Income, total	$79,055
Telephone business	$75,875
Interest on bonds and dividends on stock of other telephone companies	$2,700
Real estate rentals	$480
Expenses, total	$55,150
General operation and maintenance (including salaries and wages)	$40,713
Rentals (offices and other real estate)	$1,866
Taxes—	
On real and personal property	$782
On earnings	$4,639
Interest—	
On funded debt	$5,202
On floating debt	$1,948
Cost of lines, real estate, equipment, etc., added during the year	$21,769
Balance sheet:	
Assets, total	$277,781
Cost of construction, equipment, and real estate	$255,041
Stocks and bonds of other telephone companies	$18,000
Cash and deposits	$401
Bills and accounts receivable	$813
Machinery, tools, and supplies	$3,526
Liabilities, total	$277,781
Capital stock	$131,000
Funded debt	$85,400
Floating debt	$30,000
Reserves	$3,500
Bills and accounts payable	$5,335
Interest due and accrued	$1,000
Sundries	$1,500
Profit and loss surplus	$20,046
Capitalization:	
Common stock, authorized, par value	$198,000
Common stock, outstanding, par value	$131,000
Dividends on stock	$2,700
Funded debt, authorized, par value	$88,000
Funded debt, outstanding, par value	$85,400
Interest on funded debt	$5,202
Employees and wages:	
Salaried employees—	
Number	16
Salaries	$11,326
Wage-earners—	
Total average number	92
Total wages	$23,423
Operators—	
Male—	
Average number	3
Wages	$720
Female—	
Average number	58
Wages	$11,796
All other employees—	
Average number	31
Wages	$10,907

The conditions surrounding the telephone industry in the United States are entirely different from those in Porto Rico, and no direct comparison can be made of the per capita use of telephones in the two countries.

CENTRAL ELECTRIC LIGHT AND POWER STATIONS.

In addition to the street railway companies which had franchises for lighting in San Juan and Ponce, the following central stations for generating electric current for light and power were reported: (1) Lopez, Villamil & Co., of Utuado; (2) a municipal plant owned by the city of Arecibo; (3) the Mayaguez Light and Power Company, of Mayaguez; and (4) the Sociedad Anónima Luz Eléctrica, of San Juan. The firm operating the plant in Utuado was in process of liquidation, and the company in Mayaguez was in the hands of a receiver. One of the plants owned by incorporated companies is operated in connection with an ice plant; and the current generated in the municipal plant at Arecibo is also used to operate the pumps for the water supply of the city. As reports were not secured for central electric stations at the census of 1902, there

are no statistics that can be compared with those for 1907, which are given in the following tables:

TABLE 4.—*Equipment—central electric light and power stations of Porto Rico: 1907.*

Number of stations	4
Arc lamps, aggregate	377
Total open	131
Total inclosed	246
Public, total number	333
Open	131
Inclosed	202
Direct current—	
Open	131
Inclosed	98
Alternating current, inclosed	104
Commercial, total number	44
Direct current, inclosed	39
Alternating current, inclosed	5
Incandescent lamps wired for service, total	13,397
Public	515
16-candlepower	335
32-candlepower	152
All other candlepower	28
Commercial	12,882
16-candlepower	7,513
32-candlepower	883
All other candlepower	4,486
Lamps for lighting the companies' properties:	
Arc	2
Incandescent	98
Motors:	
Stationary—	
Number	34
Horsepower	226
Fan, number served	261
Meters on consumption circuits (all kinds)	844
Transformers in circuits for customers:	
Number	26
Kilowatt capacity	166
Number of customers furnished electric current	1,974
Number of customers supplied with current for cooking or heating apparatus	29
Power and generating plants:	
Steam engines—	
Number	7
Horsepower	1,050
Water wheels—	
Number	3
Horsepower	256
Dynamos—	
Number	15
Kilowatt capacity	972
Direct current, constant voltage—	
Number	9
Kilowatt capacity	597
Direct current, constant amperage—	
Number	2
Kilowatt capacity	50
Alternating and polyphase current—	
Number	4
Kilowatt capacity	325
Output of stations, kilowatt hours, total for year	1,487,643

TABLE 5.—*Financial data—central electric light and power stations of Porto Rico: 1907.*

Number of stations	4
Cost of construction and equipment:	
Total to date	$146,705
During the year	3,846
Income, aggregate	143,014
Lighting	112,751
Commercial, total	74,930
Arc lamps	648
Incandescent lamps	74,282
Public, total	37,821
Arc lamps	29,883
Incandescent lamps	7,938
Motor service, stationary	11,177
All other electric service	5,268
Sale of supplies and fixtures and all other sources	13,818
Expenses, aggregate	86,905
Supplies and materials for repairs and replacements, total cost	38,959
Incandescent lamps	763
Lamp fittings, sockets, carbons, globes, hoods, and other lamp supplies, etc	1,170
Poles and other supports	729
Wire and cable	362
Fuel	32,652
Meters and all other supplies and materials, water for boilers, mill supplies, etc	3,283
Miscellaneous expenses, total	12,807
Taxes	2,586
Rent of offices, insurance, rent of stations, and line-wire supports, conduits, or underground privileges	2,104
Ordinary repairs of buildings, machinery, etc	5,130
Interest, advertising, office supplies, law expenses, telegraph and telephone service, etc	2,987
Salaries and wages, total	35,139
Salaries	16,217
Wages	18,922
Capitalization:	
Common stock—	
Amount authorized, par value	88,100
Amount outstanding, par value	53,100

As compared with the large stations found throughout the United States, the four central electric stations in operation in Porto Rico during 1907 were small properties. They do not furnish all of the current used for general commercial purposes, however, as the railway companies, in addition to the generation of power for the operation of their cars, supply electricity for lighting and general motor service. In Table 6 the lamps, stationary motors, and meters on consumption circuits, as reported by central stations and railways, are given so as to show the totals for the equipment that had been installed at the close of the census year.

TABLE 6.—*Lamps, motors, and meters reported by central power stations and electric railways: 1907.*

	Total.	Central stations.	Railways.
Arc lamps, total number	469	377	92
Open	141	131	10
Inclosed	328	246	82
Incandescent lamps, total number	34,519	13,397	21,122
16-candlepower	20,118	7,848	12,270
32-candlepower	2,956	1,035	1,921
All other candlepower	11,445	4,514	6,931
Other varieties of lamps (Nernst, etc.)	19	.....	19
Stationary motors:			
Number	61	34	27
Horsepower	438	226	212
Meters on consumption circuits (all kinds)	2,158	844	1,314

The 469 arc and 34,519 incandescent lamps shown in this table were wired for use in lighting the streets, roads, public places, dwellings, and industrial and commercial establishments. The companies in addition used 15 arc and 693 incandescent lamps to light their own properties, for which no revenue was reported.

From a comparison of the figures given in Table 6, it is evident that the electric railway companies furnish the greater portion of the current used for incandescent lamps. Of the 34,519 lamps, the railway companies reported 21,122, and the central stations 13,397. On the other hand, the central stations supply current for much the larger proportion of arc lamps for lighting streets and public places. The number of stationary motors is divided about equally between the two branches of the industry.

In regard to the use of electric current for light and power in Porto Rico, the most obvious feature is the small number of central stations engaged in the business. Out of 57 cities or municipalities reported at the census of 1899 as having a population of 1,000 or more, only 6, in 1907, were lighted by electricity. In order of population these towns were San Juan, Ponce, Mayaguez, Arecibo, Utuado, and Río Piedras.

ELECTRIC RAILWAYS.

Measured by the capital invested, equipment, and business, the electric railways are by far the most important branch of the electrical industries of Porto Rico. There were three street railway systems in operation in 1907: the Ponce Railway and Light Company, a combined street railway and electric lighting concern, of Ponce; the San Juan Light and

Transit Company, which in 1907 operated between San Juan and Río Piedras, and also held a lighting franchise; and the Sociedad Anónima Tranvía de Mayaguez, an animal street railway in Mayaguez. The two latter companies only were reported in 1902.

TABLE 7.—*Comparative summary—track, equipment, and traffic—street and electric railways of Porto Rico: 1907 and 1902.*

	1907	1902
Number of companies	3	2
Track—character and length in single track miles:		
Total owned	17.72	12.56
First main track	13.98	12.11
Second main track	1.52	.....
Sidings and turnouts	2.22	.45
Overhead trolley	14.59	9.43
Animal	3.13	3.13
On private right of way, owned by company	3.29	.....
Within city limits	14.43	3.88
Outside city limits	3.29	8.68
Steam railroad crossings, protected	2	1
Steam railroad crossings, unprotected	4	1
Overhead trolley line construction, miles	14.59	9.11
Span wire	1.31	9.11
Side bracket	13.28	.....
Miles of line with wooden poles	[1]13.84	9.11
Number of cars, total	55	34
Passenger	47	26
Closed	28	17
Open	17	9
Combination, closed and open	2	.....
Express, freight, and mail	8	[2]8
Motor cars	32	13
Two motors	24	([3])
Four motors	8	([3])
Trailers	23	21
Equipment of cars:		
With fenders	25	13
With hand brakes	49	29
With air brakes	8	[4]11
Lighted by electricity	34	13
Lighted by oil, gas, etc	14	14
Lamps for lighting the companies' properties:		
Arc	13	2
Incandescent	595	171
Miles of telephone line exclusively for operation of road	7	9
Power and generating plants:		
Power houses, number	2	1
Steam engines—		
Number	7	4
Horsepower	2,025	700
Steam turbines—		
Number	1	.....
Horsepower	750	.....
Auxiliary engines—		
Number	5	.....
Horsepower	100	.....
Direct-current dynamos—		
Number	4	2
Kilowatt capacity	600	448
Alternating-current dynamos—		
Number	6	2
Kilowatt capacity	1,370	448
Auxiliary electric equipment—		
Transformers—		
Number	2	.....
Kilowatt capacity	30	.....
Auxiliary generators—		
Number	6	.....
Kilowatt capacity	69	.....
Direct-current motors for miscellaneous work—		
Number	1	.....
Horsepower	20	.....
Output of stations:		
Kilowatt hours, total for year	3,153,838	1,044,995
Average per day	8,639	2,863
Number of passengers carried, total	5,291,306	2,241,930
Fare	5,255,798	2,241,930
Free	35,508	.....
Car mileage, total	823,598	430,376
Passenger cars	817,951	430,376
Express, freight, mail, and work cars	5,647	.....
Car hours, total	113,966	.....
Passenger cars	111,310	.....
Express, freight, mail, and work cars	2,656	.....

[1] .75 mile of construction supported by structures other than poles.
[2] Includes 7 work and miscellaneous cars.
[3] Not reported.
[4] Other mechanical brakes.

In addition to the three companies named above, the Caguas Tramway Company was engaged in the construction of a railway to be operated between Río Piedras and Caguas. Although this road was originally designed to be operated by electricity, permission was granted by the executive council of Porto Rico to allow it to be operated by steam, with the provision that it should be electrically equipped within ten years. During the census year no portion of the system was in operation, and therefore no statistics for it are included in this report.

The statistics given in detail in Table 7 convey a definite idea of the character and extent of the electric railways, and also furnish a comparison of the increase in their equipment since 1902.

As compared with the street and electric railway equipment of continental United States, which comprises 34,403.56 miles of track, the 17.72 miles operated in Porto Rico are insignificant. The properties have necessarily been developed on a comparatively small scale, but the density of the population, which is greater here than in the majority of the states, warrants the belief that the increase during the next five years will be greater even than that shown in Table 7 for 1907 as compared with 1902. During the five years the number of passengers carried more than doubled, but there are no statistics of population later than those of the census of 1899 on which the average number of rides per inhabitant can be computed, therefore no comparison of such averages can be made for the railways in Porto Rico and those in continental United States or any other country to indicate the possible development in the island.

The output in current of the electrical generators reported for 1907 was three times as great as that for 1902, and the power and generating plants had been greatly enlarged.

In Table 8 the financial statistics for the three railway companies are summarized.

The small number of companies in Porto Rico makes it impracticable to show the financial statistics with the same amount of detail that is given for the companies in the United States.

The $376,492 reported for earnings from operation includes all receipts for the year of the companies from the actual operation of the railway property and of the light and power plants connected therewith. It does not include income from sources other than the operation of the plant, such as the sale of electric fixtures and miscellaneous, which are reported as "miscellaneous income" and amounted to $5,244. The $121,880 shown as "all other earnings" which is composed of the amounts received for the sale of electric current, the carriage of freight and mail, chartered cars, and miscellaneous items, forms 32.4 per cent of the income from operation.

TABLE 8.—*Income account and balance sheet—street and electric railways of Porto Rico: 1907.*

Number of companies	3
Income account:	
Gross earnings from operation	$376,492
Passengers	254,612
All other earnings	121,880
Operating expenses	219,790
Maintenance of ways and structures	9,931
Maintenance of equipment	18,289
Operation of cars	33,640
General	40,235
All other operating expenses	117,695
Net earnings from operation	156,702
Miscellaneous income	5,244
Gross income less operating expenses	161,946
Deductions from income (taxes and fixed charges)	83,334
Taxes	13,818
Interest	69,516
Net income	78,612
Balance sheet:	
Assets, total	2,093,831
Cost of construction, equipment, and real estate	1,971,512
Cash on hand	17,624
Bills and accounts receivable	62,350
Supplies	32,284
Sundries	10,061
Liabilities, total	2,093,831
Capital stock (common)	696,400
Funded debt	934,786
Floating debt	365,723
Reserves	15,045
Bills and accounts payable	7,650
Interest due and accrued	18,392
Sundries	3,722
Profit and loss surplus	52,113

The $219,790 reported as operating expenses includes all expenditures incident to the actual operation of the plant and equipment for the year. The principal items constituting this total are shown separately. The $117,695 reported for "all other operating expenses" represents expenditures for the power plant, wages, supplies, and miscellaneous expenses for the electric light service. The relation of the earnings from operation to the expenses of operation, as well as the distribution of the earnings among the various items of expense, differs materially among different classes of railways. The distribution for each company depends upon the conditions under which it was operated during the census year. Proportions, based on the totals furnished by several companies, therefore, can only indicate general conditions. It is interesting, however, to compare the percentages for the three companies in Porto Rico with those based on the totals for all operating companies in the United States. This comparison is made in the following statement:

Per cent distribution of gross earnings from operation and operating expenses, and average earnings and expenses—street and electric railways of the United States and Porto Rico: 1907.

	United States.	Porto Rico.
Per cent operating expenses is of gross earnings from operation	60.1	58.4
Per cent passenger earnings is of gross earnings from operation	91.4	67.6
Per cent net earnings from operation is of gross earnings from operation	39.9	41.6
Per cent distribution of operating expenses:		
Maintenance of ways and structures	10.2	4.5
Maintenance of equipment	12.5	8.3
Operation of cars	40.0	15.3
General	17.3	18.3
All other operating expenses	20.0	53.5
Operating earnings per mile of track	$12,268.00	$21,247.00
Operating earnings per car mile	0.2597	0.4571
Operating expenses per car mile	0.1561	0.2669
Operating expenses per fare passenger	0.0339	0.0418
Passenger earnings per fare passenger	0.0515	0.0484
Net earnings per mile of track	4,895.00	8,843.00

The wide differences in the percentages and averages for the two localities is caused chiefly by the inclusion of expenses for and income from electric light and power service in a much larger proportion for Porto Rico than for the United States. Both of the electric railways on the island were engaged in the sale of current to a large extent.

The balance sheet given in Table 8 is the total of the assets and liabilities reported by the three companies. The $1,971,512 reported as "cost of construction, equipment, and real estate" forms 94.2 per cent of the total assets. This total should not be accepted as the actual cash which has been invested in tracks, appliances, and equipment. Changes in ownership, lack of records, and various other conditions which are explained in the Census Report on Street and Electric Railways in the United States, make it impossible to secure satisfactory statistics for a combined balance sheet.

Next to the value of capital stock and funded debt, "floating debt," which is composed of advances made by the holding companies to the operating companies, is the most important liability.

HISTORY.[1]

TELEGRAPH SYSTEMS.

I. INSULAR TELEGRAPH AND TELEPHONE SYSTEM.

The history of the use of the telegraph in Porto Rico is exclusively that of the telegraph system established and operated, first by the Spanish Government and afterwards by the American authorities, as a public government service. As far as information can be obtained, no telegraph system has ever been established by private parties; even the railroads of the island make use of the telephone instead of the telegraph for the operation of their systems. The use of the telephone in place of the telegraph is indeed one of the features of the development of means of communication in the island.

Under Spanish rule the central government of Porto Rico maintained and operated a telegraph service in connection with its postal system, and there was a telegraph station belonging to the government in every town and in almost every village of the island. But little information is obtainable of operations during this period. The report of Brig. Gen. George W. Davis on the Military Government of Porto Rico from October 18, 1898, to April 30, 1900, has this to say concerning conditions then prevailing, which it is of interest to reproduce:

> Nearly all of the municipal centers of the island were connected with the capital by electric telegraph. The lines were installed by the state some twenty-five years ago, and were operated in connection with the postal service, the postmaster being usually the telegraph operator. The service, however, fell far short of being self-sustaining, for the budget of the line for 1897–98 carried the allowance of $36,540. The line receipts were not stated; but there is no item of income to the island given on the revenue side of the budget as derived from the telegraph. This service, therefore, cost some 36,000 pesos more than it earned.

On the American occupation, the whole system was placed in charge of the Signal Corps of the United States Army. No inventory was obtained of the property received from the Spanish Government, but on October 31, 1899, the military government valued the system as it stood at $33,086.40. On July 1, 1899, there existed one line running around the island, two other lines across it—one of which was a line of two wires—and six branch lines to interior towns. The wires of these lines aggregated 1,240.5 kilometers (770.8 miles) in length, and the offices on these lines were thirty-two in number. On August 8, 1899, however, occurred the destructive hurricane of San Ciriaco, which prostrated all the wires on the island so that there was not an instance where telegraph communication between any two points remained. The system, consequently, had to be entirely reconstructed. In this reconstruction the Signal Corps combined a number of the less important posts, so that the number of stations was reduced to twenty, and the length of wire, including parallel lines, to 772 kilometers (479.7 miles).

It appears that the system was operated by the military government at a considerable loss, the cost of maintenance and operation greatly exceeding receipts. The chief signal officer reported that from October 1, 1898, to November 30, 1900, the total receipts of the service amounted to $37,872.97, and expenses to $141,990.03, showing a total deficit of $104,117.06. Although there are no figures available for the period from December 1, 1900, to February 1, 1901, it is reasonable to suppose that much the same results were obtained during that period.

Although the present civil government was organized on May 1, 1900, the telegraph service was not turned over to it by the military authorities until February 1, 1901. At this time the telegraph service was on a very small scale; there were but eighteen stations in the island, and the character of equipment and lines was far from satisfactory. The insular government, actuated partly by the desire to give to the public a more comprehensive system, and partly by the need, felt to be imperative, of keeping itself in constant and immediate touch with its offices throughout the island so that prompt information might be received of all important happenings, has proceeded vigorously with the work of extending the system. At the present time, consequently, there are few towns or other centers of population that do not enjoy this means of communication with other parts of the island.

In extending the service to all parts of the island, stations were established in many places where receipts fell short of meeting actual expenses of operation, to say nothing of amortizing the first cost of installation. In 1906 the commissioner of the interior reported to the insular legislature that the service might be greatly cheapened by converting the less important stations into telephone offices, thus avoiding the expense of a skilled telegraph operator; and that it might be greatly extended by installing telephones where it would not be practicable to open telegraph offices. The legislature, acting on this information, on March 8, 1906, made a special appropriation of $15,000 for the exten-

[1] This portion of the bulletin was prepared by Mr. William F. Willoughby, secretary of Porto Rico.

sion of the insular telegraph system by means of telephone lines.

As the results obtained from the expenditure of this money proved satisfactory, the legislature in the following year, by an act approved March 14, 1907, appropriated a further special sum of $25,000 for the development of the insular telegraph system by the construction of telephone lines. This act, however, went a step further than its predecessor. The act of 1906 had only in view the conversion of minor telegraph offices into telephone stations. The idea was that messages for transmission by telegraph would be received at such stations and telephoned to the nearest telegraph office, where they would be transmitted to their destination in the usual way. The act of 1907, however, contemplated the entrance by the government into the field of telephonic communication proper, and the conversion of the service, in fact, into a government telegraph and telephone system. It thus provided:

SECTION 1. That the commissioner of the interior is hereby empowered and directed to provide for the extension of the insular telegraph service by means of the construction, maintenance, and operation of a system of long distance and local telephone lines, to be operated in connection therewith. Said system of long distance and local telephone lines shall include the construction, maintenance, and operation of:

(1) A long distance telephone line between the towns of San Juan and Ponce.

(2) To establish local telephone exchange in towns between San Juan and Ponce or in other towns of the island which are not covered by any existing telephone franchise, and which in the opinion of the commissioner of the interior may advantageously be established in connection with the said long distance telephone line or the insular telegraph system.

(3) Lines to connect towns, haciendas, factories, dwellings, or other places when in the opinion of the commissioner of the interior this can be done advantageously with the said long distance telephone line or with the insular telegraph system for the purpose of transmitting telegraphic and telephonic messages.

SEC. 2. The commissioner of the interior, with the approval of the executive council, shall have power to fix a schedule of charges for the use of the telephone system hereby provided for, to determine the conditions under which individual haciendas, factories, dwellings, or other places shall be connected with said system, and to make all other necessary regulations for the due conduct of the service. He shall have power to employ the necessary help for such purpose, but the compensation of such employees shall, until the legislative assembly of Porto Rico otherwise determines, be fixed by the executive council of Porto Rico: *Provided*, That telephone messages sent or received by newspapers or periodicals shall be charged at half the rate charged to the public.

SEC. 3. The commissioner of the interior, with the approval of the executive council, shall have power to enter into agreements with persons or corporations, now in possession of franchises or concessions authorizing them to maintain local or long distance telephone systems in the island, by which the telephone system hereby authorized may be connected with, and operated in conjunction with, such system or reciprocal use of the systems be had.

SEC. 4. In order to carry out the provisions of this act there is hereby appropriated, out of moneys in the treasury not otherwise appropriated, for the balance of the fiscal year ending June 30, 1907, and the fiscal year ending June 30, 1908, the sum of $25,000.

SEC. 5. This act shall take effect on and after its approval.

In the account given hereafter of telephone systems in the island, it will be seen that at the present time two private corporations, under franchises granted by the executive council, are operating long distance and local telephone systems in the island. The territories assigned to these two companies are, roughly speaking, the north and south coasts, respectively, though they extend around the western end of the island and join at the town of Hormigueros. It was the idea of the legislature in passing the act of 1907 that the government should enter chiefly the territory in the interior of the island not covered by these two concessions, and thus, by making what may be called traffic agreements with these companies, give to the island a very extensive telephone system. At the same time it was believed that the extensions planned would prove a very profitable investment to the government. In this connection it may be stated that both the franchises of the private companies provide that the systems may be taken over by the government at any time upon the payment of a fair valuation of the property taken. The insular government is thus in a position, should it ever desire to do so, to take over these properties, and thus center in one system all services for telegraphic and telephonic communication.

The telegraph system, on being received by the civil government from the military authorities, was placed under the interior department, a special "bureau of insular telegraph" being created for its management. At that time the policy was also adopted of attempting to keep the financial operations of the bureau distinct from those of the general treasury. To carry out this purpose, all receipts from the service, instead of being covered into the general funds of the treasury, were carried to a special "trust fund," from which in turn all expenditures of the service were to be made. As the system was not self-supporting, the governor of Porto Rico, on the establishment of the service, transferred from his special emergency fund to the telegraph trust fund the sum of $7,029.74. Thereafter the legislature had to include in its annual appropriation acts sums to be carried to this fund, partly to meet deficiencies resulting from excess of cost of operating expenses over receipts, and partly to make provision for the extensions of the system which, as has been stated, were carried through on an important scale.

Later the opinion was reached that no object was gained by treating telegraph receipts and expenditures as trust funds, as the object sought—that of knowing exactly what the receipts and expenditures of the system were—could be gained better by taking proper precautions in bookkeeping. Beginning with the fiscal year ending June 30, 1903, the insular telegraph service has, consequently, been treated as other services of the government.

With a view to showing the development of the system since July 1, 1901, the following table brings

together certain data relative to the number of offices in operation and the receipts and expenditures. In this table cash receipts and expenditures are taken from the books of the auditor, while the value of free messages is given as reported by the bureau of insular telegraph. Prior to October 1, 1905, all government messages were transported free. On that date, however, the change was made by which—while the governor of Porto Rico, the insular police, members of the legislature, and officers of the United States Army and Navy continued to have their messages sent free—all other officials had to pay half rates, the cost of such messages being met by them out of the contingent funds appropriated for the several departments and services of the government. This change in policy is evidently one of considerable importance in interpreting the figures showing receipts as contrasted with expenditures of the service.

Financial operations of the Bureau of Insular Telegraph, fiscal years ending June 30, 1902 to 1908.

FISCAL YEAR ENDING JUNE 30.	Number of offices.	RECEIPTS.			Expenditures.
		Total.	Cash.	Value of free messages.	
Total	.....	$374,031.06	$273,974.48	$100,056.58	$395,345.44
1908	72	54,493.87	46,659.77	7,834.10	84,162.61
1907	69	65,285.09	59,226.07	6,059.02	68,690.42
1906	46	65,012.67	52,075.84	12,936.83	59,662.95
1905	43	66,630.21	34,091.22	32,538.99	58,186.02
1904	40	47,154.24	30,179.24	16,975.00	44,601.53
1903	32	49,020.86	29,287.90	19,732.96	42,396.88
1902	32	26,434.12	22,454.44	3,979.68	37,645.03

It is apparent from the foregoing that the operations of the bureau have increased greatly in the seven years since the service was taken over by the civil government. The development during the last two years is, to a considerable extent, due to the adoption of the policy, heretofore described, of entering the field of telephonic communications. Regarding this feature of the development of the system, the commissioner of the interior in his last annual report—that for the fiscal year ending June 30, 1908—states as follows:

The two long distance copper wires of 130 kilometers (80.8 miles) each leading from San Juan to Ponce have been completed, connecting the intermediate towns of Caguas, Cayey, Aibonito, and Juana Diaz, thus insuring telephone communication on the north and south coasts connected by telephone exchanges. The town of Ceiba has been connected by telephone at Fajardo to operate in conjunction with the heliograph at Vieques. Barceloneta has been placed in communication by a line of telephone with Manati. The Caguas local telephone exchange was completed and in operation on December 16, 1907, with 135 subscribers, with capacity for increase to 150 subscribers. The switchboard installed is of the latest improved magneto type; the outside construction is composed of pole lines and aerial cable, each subscriber being connected with the central station by two wires (metallic circuit). The material and apparatus used in the system is of the very best quality, and the work has been done according to modern practice, up-to-date methods having been employed throughout.

As an adjunct to the telegraph and as a revenue producer, at slight additional expense, it may be stated that for the six months from July to December, 1907, inclusive (prior to the installation of the telephone), the gross cash receipts of the telegraph office at Caguas amounted to $904.13, an average of $150 per month. After the opening of the telephone service, for the six months from January to June, 1908, inclusive, the cash revenue amounted to $2,452.89, an average of $409 per month. Telephone exchanges are now under construction at Cayey and Aibonito, and it is proposed to also build exchanges at Humacao, Fajardo, Lares, and Utuado. Preparations have been completed to build a telephone line from Loiza to Carolina and connect Fajardo to the telephone system of lines.

It is much to be regretted that the financial operations of this service were not recorded in such a way as to make possible clear statements of assets and liabilities, at the end of the year, and income and expenditure, so that a distinction could be made between expenditures for operation and for extensions of plant, and thus permit of accurate information being obtained in respect to the extent to which the system has been self-supporting, productive of a net income, or the reverse. This, however, has not been done, and consequently it is impossible to present data showing definitely the extent to which the service has, from a purely financial aspect, been a profitable one to the government. It is of course apparent, on consulting the table previously given, that total expenditures during the period covered have very considerably exceeded not only cash receipts, but receipts plus the value of government business transacted free or at half rate. The table shows that, during the seven years, total expenditures have amounted to $395,345.44, while total cash receipts have been only $273,974.48, and total receipts, plus value of free and half-rate government messages, $374,031.06. Expenditures thus show an excess of $121,370.96 over cash receipts, and $21,314.38 over cash receipts plus the value of free and half-rate messages. Against this excess of expenditures, however, must be set the fact that such expenditures represent not merely operating expenses, but moneys expended for the development and extension of the plant. The expenditures thus include not only expenditures made under the two special appropriation acts, of $15,000 and $25,000, for extension of the system by means of telephone lines, but new work in the nature of extensions and improvements made out of ordinary appropriations for the maintenance of the system. It is a source of congratulation that the bureau of insular telegraph has now recognized the desirability of keeping its accounts according to the most approved methods of business accountancy, and that a new system has been devised and put into operation on July 1, 1908, by which detailed information concerning receipts and expenditures will be available for the future in such a form that the necessary facts regarding financial operations and results will be readily obtainable.

In considering this matter of financial returns, account should also be taken of the fact that the rates charged have been very moderate. From February 1, 1901, to April 15, 1907, the commercial rate was 20 cents for a message of ten words, not counting address or signature, and 2 cents for each additional word. Punctuation marks and numerals, when sent in the body of the message, were counted and charged for as one word each. On the latter date the commercial rate was reduced to 15 cents for a message of ten words, with 1 cent for each additional word, with the same provision regarding address, signature, punctuation, etc. This great reduction in rate that was made on April 15, 1907, is responsible for the marked decrease in receipts during the fiscal year ending June 30, 1908, as the bureau of insular telegraph reports that the volume of business transacted during that year exceeded greatly the business of any prior year. The rates charged for local telephone service in those towns where the service has established local exchanges, are as follows:

A flat rate of $2 per month for a single party line, unlimited and continuous local service, up to and including one-half mile distant from exchange.

A flat rate of $1 per month for two or more party lines, continuous and unlimited local service, up to and including one-half mile distant from exchange.

Fifty cents to be added to above monthly rates of rental for each additional mile or fraction thereof distant from the exchange.

It should be stated that the bureau of insular telegraph has made traffic agreements with the telephone company operating on the south coast, by which the two systems are connected and an interchange of messages made possible between subscribers of the two systems. Negotiations are now under way with the telephone company operating on the north coast for the establishment of a similar arrangement. As soon as this is accomplished all of the subscribers of the insular government and the two private public service telephone corporations will be brought into communication with each other.

TELEPHONE SYSTEMS.

I. GENERAL PUBLIC SERVICE TELEPHONE SYSTEMS.

The American Government, upon its occupation of Porto Rico in 1898, found in existence and operation local telephone systems in the three principal cities of the island—San Juan, Ponce, and Mayaguez. Concessions for the establishment of these systems had been granted in accordance with general provisions of law or royal orders governing the granting of concessions of this character not only in Porto Rico but in Cuba and Spain.

The first royal decree published in regard to telephones is believed to be that of August 16, 1882, which was substituted, as regards Spain, by the royal order of August 11, 1884, which latter order was extended to Cuba and to the island of Porto Rico by royal order of April 20, 1885. This order made reference to concessions made for telephone lines in accordance with the provisions of the royal decree of June 30, 1871. This last-named decree was relative to the telegraph, but its provisions, wherein applicable, were subsequently extended to the telephone. The provisions of subsequent decrees and orders have modified, in more or less important respects, those of these original decrees and orders.

The more important of these documents, including the ones already cited, in so far as they refer to the establishment and maintenance of telephone systems in Porto Rico, are: The royal decree of June 30, 1871; the royal order of August 11, 1884; the royal decree of May 12, 1888; the royal order of May 12, 1888, approving the document of general conditions to govern concessions for the establishment and operation of telephone systems in the islands of Cuba, Porto Rico, and the Philippines, granted in accordance with the provisions contained in royal order of the same date; the royal decree of May 16, 1890, amending that of May 12, 1888, on telephone systems; and the royal order and document of conditions, which are to govern concessions granted in accordance with the royal decree of May 16, 1890, for the establishment and operation of telephone systems in the islands of Cuba, Porto Rico, and the Philippines. Copies of these various royal decrees and orders can, for the most part, be best consulted in the Report on Military Telegraph Lines in Porto Rico, by Brig. Gen. A. W. Greeley, chief signal officer, United States Army. (Senate Document No. 429, Fifty-sixth Congress, first session, Washington, Government Printing Office, 1900.) In this report is given a general account of telegraph, telephone, and cable lines in Porto Rico at the date of the American occupation, and it is almost the only document in English giving information regarding the situation of affairs in the island as regards telegraphic and telephonic communications prior to the American occupation.

These royal decrees and orders set out in detail the conditions that had to be observed in the granting of concessions for the establishment of telephone lines and the provisions that should afterwards govern their maintenance and operation. Among the more important of these general provisions were: (1) That connecting telephone lines and stations within a radius of 10 kilometers (6.2 miles) should constitute a system; (2) that a concession should be for a period of twenty years, at the expiration of which the entire plant should become the property of the state, without the payment of any compensation; (3) that the concession should

be granted to the person or company offering terms most advantageous to the public upon a public call for bids; (4) that such public call for bids should be advertised for at least thirty days; (5) that a maximum rate should be fixed for the handling of messages and for subscriptions; (6) that the bids should provide for the payment to the state of not less than 6 per cent of gross receipts; (7) that a certain number of free telephones should be furnished the government; (8) that certain technical requirements concerning the installation and maintenance of the equipment in an efficient condition should be observed; (9) that the state should have the right to inspect the system at any time; and (10) that the state should be at liberty at any time to establish independent lines or systems of lines for official purposes.

In accordance with the provisions of these royal decrees and orders, as above summarized, three concessions were granted for the establishment of telephone systems in Porto Rico, as follows:

(1) San Juan, February 25, 1897, to Rafael Fabian y Fabian and Antonio Ahumada, the royalty provided for being 12½ per cent of gross receipts.

(2) Ponce, March 10, 1897, to Alfredo B. Casals y Agaña, and immediately transferred to the Compañía Anónima de la Red Telefónica de Ponce, the royalty provided for being 20½ per cent of gross receipts.

(3) Mayaguez, November 1, 1897, to Rafael Fabian y Fabian, the royalty provided for being 6½ per cent of gross receipts.

All of these concessions expire and their property becomes the property of the insular government twenty years from the date of the concession, as above given—that is, sometime in the year 1917.

In pursuance of these concessions the systems were duly organized and were in operation at the time of the occupation of the island by American forces. It is to be regretted that no data are at hand showing the cost of installation of such systems or the number of instruments in service. It may be said, however, that the systems did not correspond in every respect to the requirements of an efficient service, and that the number of subscribers was not great in proportion to the total population of the district served. Some idea of the extent of the operations of these three local systems, however, may be obtained from the following statement of the gross receipts and the royalty paid to the government each fiscal year since the fiscal year ending June 30, 1901:

Gross receipts and royalties paid thereon by telephone companies in San Juan, Ponce, and Mayaguez.

FISCAL YEAR ENDING JUNE 30.	TOTAL.		SAN JUAN.		PONCE.		MAYAGUEZ.	
	Gross receipts.	Royalties.	Gross receipts.	Royalties.	Gross receipts.	Royalties.	Gross receipts.	Royalties.
Total	$172,087.01	$25,084.34	$99,103.37	$12,389.03	$56,795.77	$11,643.10	$16,187.87	$1,052.21
1908	32,684.76	4,681.33	20,424.62	2,553.07	9,509.91	1,949.49	2,750.23	178.77
1907	31,861.33	4,577.44	19,854.22	2,481.78	9,393.06	1,925.74	2,614.05	169.92
1906	27,547.71	3,998.07	16,721.80	2,090.21	8,601.31	1,763.27	2,224.60	144.59
1905	23,727.54	3,505.30	13,187.69	1,649.59	8,361.85	1,714.14	2,178.00	141.57
1904	[1] 18,360.67	[1] 2,924.21	[1] 8,359.22	[1] 1,044.90	8,780.15	1,799.93	[1] 1,221.30	[1] 79.38
1903	21,500.23	3,197.19	10,551.90	1,318.99	8,333.40	1,708.23	2,614.93	169.97
1902	16,404.77	2,200.80	10,003.92	1,250.49	3,816.09	782.30	2,584.76	168.01

[1] The amounts shown for the fiscal year 1904 for San Juan are for July, August, and September, 1903, and the first six months of 1904, and those for Mayaguez are for the six months from January to July, 1904; it was impossible to secure the data for the missing months.

The total gross receipts of the telephone companies as shown in Table 3 in the statistical section of this bulletin do not agree with the total gross receipts of the three telephone companies operating in San Juan, Ponce, and Mayaguez, as shown in this statement. The latter table shows simply the total receipts of the three local companies operated in the three cities. The figures contained in Table 3 include not only the receipts of these three companies, but also of the other operations of the three companies. As explained hereafter, the two general telephone companies, the Porto Rico General Telephone Company and the South Porto Rico General Telephone Company, acquired and are operating the three local companies, consequently the receipts of the three local companies constituted but a part of the total receipts of the general companies.

All three of these concessions have changed hands by transfer one or more times, and are now in the possession of the two general telephone companies that have been established since the organization of civil government, under franchises granted by the executive council, the history of the establishment of which will now be given.[1]

[1] The organic act of April 12, 1900, establishing civil government in Porto Rico, provided that "all grants of franchises, rights, and privileges or concessions of a public or quasi public nature shall be made by the executive council with the approval of the governor, and all franchises granted in Porto Rico shall be reported to Congress, which hereby reserves the power to amend or modify the same."

This provision was modified by a joint resolution of Congress, approved May 1, 1900, which provided that "all railroad, street railway, telegraph and telephone franchises, privileges or concessions granted under section thirty-two of said act shall be approved by the President of the United States, and no such franchise, privilege, or concession shall be operative until it shall have been so approved."

The executive council, it may be explained, is the upper house of the legislative assembly of Porto Rico, and is composed of the six heads of the executive departments, provided for by the organic act, and five other persons, all appointed by the President of the United States, by and with the consent of the Senate, for terms of four years. Not less than five of the eleven members must be native inhabitants of Porto Rico. In practice the six heads of departments have always been Americans and the other five native Porto Ricans.

Very soon after the establishment of civil government efforts were made by persons representing, for the most part, American capital to organize systems of long distance telephones to be operated in connection with existing local systems. The need for such systems was felt especially in those sections of the island devoted to the cultivation of cane, as it was of great importance to the managers of sugar centrals to be able to communicate readily with their colonos, or growers of cane, and with their agents in the more important towns. The first effort in this direction was made by the owners of the three local systems, who combined forces and secured from the executive council a franchise for the erection and operation of a system of local and long distance telephone lines to cover the whole island. This franchise was granted in the name of Pedro Juan Rosaly, and was entitled, "An ordinance granting to Pedro Juan Rosaly, his heirs, executors, administrators, and assigns, a franchise for the purpose of erecting, maintaining, and operating a system of local and long distance telephone lines in the island of Porto Rico." It was passed by the executive council on July 22, 1901, and approved by the governor on July 23, 1901, but was returned disapproved by the President of the United States for the reason that it provided for exemption of taxes, which exemption the President held could not be granted by the executive council, but only by the legislative assembly of Porto Rico.

The effort to establish a general telephone system was renewed in 1902, when a franchise was granted by the executive council on December 4, 1902, entitled, "An ordinance granting to Benjamin J. Horton the right to construct, operate, and maintain a system of long distance telephone lines extending through the island of Porto Rico and connecting various cities and towns thereof, together with local telephone exchanges in such cities and towns." This franchise was approved by the governor on December 4, 1902, and by the President of the United States on December 31, 1902. This franchise was transferred to a company organized under the name of "The Porto Rico Telephone Company," such transfer being approved by the executive council on April 9, 1903, and the bond of $10,000 required by the ordinance being given by that company. No work was done under this franchise, and the executive council accordingly, by ordinance enacted on April 19, 1906, repealed the granting ordinance and directed the attorney-general of Porto Rico to take the necessary steps for the enforcement of the penalty of the bond. Proceedings to this end were instituted and are now pending.

No further action looking to the creation of a general telephone system was taken until 1905, when an ordinance was passed by the executive council on June 5 and approved by the governor on June 6, and by the President of the United States on July 13 of that year, providing for the establishment of a general system to operate on the south coast of the island. The ordinance was entitled, "An ordinance granting to P. J. Rosaly the right to construct, maintain, and operate a system of long distance telephone lines between the city of Ponce and certain towns, together with local telephone systems in such towns." The territory mentioned is "between the city of Ponce and the town of Hormigueros and the intermediate towns of Peñuelas, Guayanilla, Yauco, Guanica, Lajas, Sabana Grande, and San German, and between the city of Ponce and the town of Arroyo and the intermediate towns of Santa Isabel, Salinas, and Guayama, including the towns of Coamo and Juana Diaz."

On March 28, 1906, this franchise was transferred to the South Porto Rico Telephone Company, a corporation organized under the laws of Maine, November 7, 1905, and authorized to do business in Porto Rico, December 11, 1905. This company shortly after beginning operations acquired absolute control of the Compañía Anónima de la Red Telefónica de Ponce and is now operating that system in connection with its own, although, owing to the different provisions of the franchises under which such local company is organized and is operating, the two companies have to maintain their separate organizations and systems of accounting. The South Porto Rico Telephone Company also took over the operation of various private telephone lines which had previously been established by different centrals, notably those of Guanica and Aguirre. As a result of this action the South Porto Rico Telephone Company now manages all of the telephone business on the south coast of Porto Rico from Arroyo on the east to Hormigueros on the west, at which latter point its system connects with that of the Porto Rico General Telephone Company.

In respect to rates charged by this company, the franchise under which it is operating provides that—

> SEC. 10. The grantee shall submit to the executive council for its approval a schedule of rates to be charged by him for the use of telephones, and no charge can be made by him until the schedule has been so approved. He may thereafter from time to time, upon reasonable notice to the public, with the approval of the executive council, change the rates established in such schedule.
>
> SEC. 11. The telephone lines hereby authorized shall be deemed to be a public service system, and such service shall be furnished to the public on demand on equal terms to all, without discrimination, and its service shall be at all times subject to effective regulation by the government and the executive council.

In accordance with the foregoing provision, the following schedule of charges was approved by the executive council on May 3, 1906, and is now in force:

> Residence telephones, $3.40 per month; business telephones, $4 per month; long distance telephones, $2 per month additional. Tolls, 1 cent per kilometer on lines according to distance. Outside

a radius of 1 kilometer of the central office in any town or city an additional charge of 30 cents per kilometer will be made for telephones connected with said central offices.

The foregoing rates apply to places outside of Ponce. In the latter city, where the system technically belongs to the old local company, though it is operated by the South Porto Rico Telephone Company, the rates are: For residences, $3 per month, and for business houses, $3.60 per month, both with unlimited service.

The operations of the foregoing company were, as has been stated, confined to the south coast of the island. On August 23, 1906, the executive council of Porto Rico granted a franchise to Sosthenes Behn to construct, maintain, and operate a system of long distance telephone lines between the towns of Carolina and Hormigueros and other intervening towns, together with local telephone systems in certain of said towns and local stations at other points. The grantee was also authorized to enter into traffic agreements with the local telephone exchanges in San Juan and Mayaguez, or to operate his system in connection with such systems, and to connect his system with others having lines entering the same towns. This permitted of connection at Hormigueros with the system of the South Porto Rico Telephone Company.

This franchise was transferred on November 18, 1906, to the Porto Rico General Telephone Company, a corporation organized under the laws of the state of Connecticut, October 7, 1907. This company has acquired the franchise and property of the local telephone companies operating under Spanish concessions in San Juan and Mayaguez, with the result that this company is now carrying on the telephone business on the north coast of the island, from the town of Carolina on the east to Hormigueros on the west, where, as has been stated, it connects with the line of the South Porto Rico Telephone Company. Although the two local systems at San Juan and Mayaguez are operated in connection with the general system, separate systems of accounts have to be maintained for them, owing to the special provisions of the concessions under which their operation is authorized.

In respect to rates, the ordinance granting the franchise provides that—

SEC. 9. The grantee shall submit to the executive council for its approval a schedule of rates to be charged by him for the use of telephones, and no charges shall be made by him until such schedule has been approved. He may thereafter from time to time, upon reasonable notice to the public, with the approval of the executive council, change the rates established in said schedule.

SEC. 10. The telephone lines hereby authorized shall be deemed to be a public service system and such service shall be furnished to the public on demand on equal terms without discrimination, and its charges and service shall be at all times subject to effective regulation by the government and the executive council.

In accordance with the foregoing, the following schedule of rates was approved by the executive council on June 20, 1907, and is now in force:

Long distance tariff—conversations not exceeding in duration five minutes.

[Rates are given in cents.]

	San Juan.	Río Piedras.	Carolina.	Bayamón.	Dorado.	Toa Baja.	Vega Alta.	Vega Baja.	Manatí.	Barceloneta.	Arecibo.	Camuy.	Hatillo.	Quebradilla.	Isabela.	Aguadilla.	Aguada.	Rincón.	Añasco.	Mayaguez.	Hormigueros.
San Juan	0	10	15	15	20	20	20	20	25	25	35	35	35	40	40	40	45	50	50	50	50
Río Piedras	10	0	10	10	15	15	15	15	20	20	30	30	30	35	35	35	40	45	45	45	45
Carolina	15	10	0	15	20	20	20	20	25	25	35	35	35	40	40	40	45	50	50	50	50
Bayamón	15	10	15	0	10	10	10	15	20	20	30	30	30	35	35	35	40	45	45	45	45
Dorado	20	15	20	10	0	0	10	10	15	15	25	25	25	30	30	30	35	40	40	40	40
Toa Baja	20	15	20	10	0	0	10	10	15	15	25	25	25	30	30	30	35	40	40	40	40
Vega Alta	20	15	20	10	10	10	0	10	15	15	25	25	25	30	30	30	35	40	40	40	40
Vega Baja	20	15	20	15	10	10	10	0	10	10	20	20	20	25	25	25	30	35	35	35	35
Manatí	25	20	25	20	15	15	15	10	0	0	15	15	15	20	20	20	25	30	30	30	30
Barceloneta	25	20	25	20	15	15	15	10	0	0	15	15	15	20	20	20	25	30	30	30	30
Arecibo	35	30	35	30	25	25	25	20	15	15	0	10	10	15	15	15	20	25	25	25	25
Camuy	35	30	35	30	25	25	25	20	15	15	10	0	0	10	15	15	20	25	25	25	25
Hatillo	35	30	35	30	25	25	25	20	15	15	10	0	0	10	15	15	20	25	25	25	25
Quebradilla	40	35	40	35	30	30	30	25	20	20	15	10	10	0	10	15	15	20	20	20	20
Isabela	40	35	40	35	30	30	30	25	20	20	15	15	15	10	0	10	10	20	20	20	20
Aguadilla	40	35	40	35	30	30	30	25	20	20	15	15	15	10	10	0	10	15	20	20	20
Aguada	45	40	45	40	35	35	35	30	25	25	20	20	20	15	10	10	0	10	15	15	15
Rincón	50	45	50	45	40	40	40	35	30	30	25	25	25	20	20	15	10	0	10	15	15
Añasco	50	45	50	45	40	40	40	35	30	30	25	25	25	20	20	20	15	10	0	10	10
Mayaguez	50	45	50	45	40	40	40	35	30	30	25	25	25	20	20	20	15	15	10	0	10
Hormigueros	50	45	50	45	40	40	40	35	30	30	25	25	25	20	20	20	15	15	10	10	0

Following is a statement of the tariff of charges for local service in San Juan, Mayaguez, and other towns embraced in the system of the company:

Tariff of charges for local service.

CITY OR TOWN.	Installation.[1]	Per month.
San Juan	Residences	$3.00
	Business houses, 150 calls	4.00
	Business houses, 150 to 450 calls	6.00
	Business houses, without limit	8.00
Mayaguez	Residences	2.50
	Business houses	3.50
Other towns	Residences	2.00
	Business houses	3.00

[1] Installations within the limits of towns are made at the expense of the company, those outside of towns at the expense of the subscribers.

The establishment and development of a telephone system by the insular government in connection with its telegraph service has already been described. It is only necessary here again to call attention to the fact that the government service is intended to serve the territory lying chiefly in the interior of the island that is not reached by the two private telephone companies, and by the making of traffic agreements with the latter to give to the island a telephone service that, as far as circumstances will permit, will reach all parts. Mention has already been made of the fact that the plants of the three local systems in San Juan, Ponce, and Mayaguez will become the property of the government without compensation in 1917, and that these plants at any time before that date, as well as the plants of the two long distance companies, may be taken by the government at any time upon payment of a fair compensation for them.

There would be a manifest advantage in having the entire service centralized in one administration, and the government may at some future time decide to exercise the option of purchase that it possesses. No proposition looking to this end, however, is now under consideration. The facts that the territory to be served is so restricted and compact, and that the government is already conducting a telegraph system and has made a beginning in the telephone field, would seem to indicate that sooner or later this question of the government taking over all the telephone lines of the island is likely to become a matter of practical importance.

Although the South Porto Rico Telephone Company and the Porto Rico General Telephone Company, one operating on the south and the other on the north coast, and connecting at Hormigueros on the west coast, together with the system of the insular government, constitute the only general public telephone systems of importance, nevertheless mention should be made of two other franchises which have been granted to persons or companies to construct and operate telephone systems for hire.

The ordinance granting to the Compañía de los Ferrocarriles de Puerto Rico the right to maintain and operate a railroad system in the island of Porto Rico, enacted by the executive council of Porto Rico on October 28, 1901, contained the following section relative to the establishment and maintenance of a telegraph and telephone system by the company:

SEC. VII. The said grantee may erect and maintain a telegraph and telephone line upon and along its right of way to be used by it for the operation of its railway lines and for no other purpose; said telegraph and telephone lines shall not be open to use by the public either for profit or otherwise. Upon the consent, however, of the executive council through the commissioner of the interior, the said telegraph line may be opened to public use for hire, upon the condition that the governor, members of the executive council, and chief heads of the departments shall have the right free of cost of sending messages and receiving replies relating to public business over said lines, and upon such other terms and conditions as may be prescribed by the executive council. And likewise the said telephone lines may be opened to the public for hire or otherwise upon the consent of the executive council through the commissioner of the interior upon such terms and conditions as the executive council may provide. The said company shall not have the power to permit the use of its said telegraph and telephone poles and wires, or to permit the use of its right of way for the erection of telegraph or telephone wires, by any person, firm, corporation, or other legal entity, natural or artificial, whatsoever, except upon such terms and conditions as the executive council through the commissioner of the interior may require: *Provided*, That said grantee may permit the use of its said telegraph or telephone lines to any person, firm, company, corporation, or legal entity having a franchise from the government of Porto Rico for doing a public telegraph or telephone business; but such use of said lines shall be subject to the royalty and other duties and obligations provided in any such franchise. At any time, however, the commissioner of the interior of Porto Rico, without compensation to the said grantee, may erect upon its right of way such poles and lines as may in the judgment of the commissioner of the interior be necessary or desirable for the operation of a telegraph service in connection with the insular telegraph lines; said telegraph lines so erected on said right of way to be the sole property of the insular government, which shall be entitled to receive all the profits arising from the use thereof; said commissioner of the interior, through his employees, shall have access to said telegraph lines at all times for making repairs and for other purposes; and upon the erection of such telegraph lines by the commissioner of the interior on said right of way, the use of its own telegraph lines by the public for hire or otherwise shall at once be stopped by the grantee.

Notwithstanding the provision that the company should not throw open its telephone lines to the public for hire without consent of the executive council, it appears that the company did do so without first obtaining such permission, and up to the end of February, 1902, had received from the public for such service a total of $576.81. When it came to the attention of the company that such action was not lawful without the permission of the executive council, the company applied for such permission and received it by an ordinance, the title of which is "An ordinance granting to the Compañía de los Ferrocarriles de Puerto Rico and to its successors and assigns the right to take and receive for hire telegraph or telephone messages between certain points along its right of way," enacted July 11, 1902. This ordinance restricts the right of the company so that it can operate its system only between those points on its line not reached by the insular telegraph system.

In pursuance of this ordinance the commissioner of the interior reports that telephone stations for the use of the public are being maintained by the railroad company at Dorado, Rincón, Río Rosario, Filial Amor, Lajas Estación, La Plata, El Limón, and Santa Rita. Only the first two places named are towns, the others being small local stations or estates. The service has been established more for the convenience of the patrons of the road than as a source of revenue. The business is conducted over the lines installed by the company for the operation of its road. The charges for the service are 25 cents for ten words or less and 2 cents for each word over ten. The company reports that its receipts from the service are only a few dollars a month.

On December 20, 1906, a franchise was granted to Juan Bertran to construct, maintain, and operate a system of long distance telephone lines between the Playa of Yabucoa and the Playa of Naguabo, and other intervening towns and cities, together with local telephone systems in certain of said towns and local stations at other points. No work has ever been done under this franchise and, as the grantee has made no effort to comply with any of the conditions of the ordinance, the latter may be considered as no longer in force.

II. TELEPHONE SYSTEMS MAINTAINED BY RAILWAY COMPANIES FOR THE OPERATION OF THEIR SYSTEMS.

In all, or practically all, cases where franchises have been granted for the establishment and operation of steam or electric railway lines, authority has been given to the grantee to install and make use of telegraph or telephone systems for the operation of those lines. In some cases grantees have availed themselves of this permission by establishing telephone systems, while in others the railroad companies have made use of the lines of the general public telephone companies. In no case does a railway company make use of a telegraph service, either public or private, for the operation of its line. Following is a statement of the practice pursued by each steam or electric railway company operating in Porto Rico:

The American Railroad Company of Porto Rico, now operating the property of the Compañía de los Ferrocarriles de Puerto Rico, maintains its own telephone system for the dispatching of trains.

The Ponce and Guayama Railroad Company has no system of its own, but makes use of that of the South Porto Rico Telephone Company under a special arrangement by which it has the use of 40 telephones for $100 per month, and the right to 30 messages per month from Ponce. There are other special provisions of this contract which need not be mentioned here.

The Fajardo Development Company has its own telephone system, which it is maintaining and operating in pursuance of the provisions of its franchise. It has in use at the date of this report 38 instruments and about 25 miles of line, while the value of the plant is placed at $3,832.69.

The steam railroad operated by Mr. Ramón Valdes between Cataño and Bayamón under the name of Tranvía de Cataño á Bayamón makes use of its own telephone system, which consists of two instruments, one at Cataño and one at Bayamón, with the necessary wire connection. This system was installed in 1882 in virtue of a special authorization from the government, and it is claimed was the first use made of telephones in the island.

The Caguas Tramway Company, whose railway line between Río Piedras and Caguas was thrown open to traffic in June, 1908, has installed its own telephone system, consisting of two instruments, one at each terminal.

The San Juan Light and Transit Company, operating an electric railroad in San Juan and between that city and Río Piedras, maintains its own telephone system, consisting of 15 instruments with necessary wires.

The Ponce Railway and Light Company, operating an electric railway in the city of Ponce and between that city and Ponce Playa, makes no use of telephones for the operation of its road. Its offices, however, are equipped with instruments of the South Porto Rico Telephone Company as ordinary subscribers to that company.

The railroad constructed by Antonio Roig between Humacao and Humacao Playa in virtue of a franchise granted to him by the executive council on August 8, 1905, which was completed in 1908, will make use of the private telephone lines owned by the same party, a concession for the erection of which was obtained from the Spanish authorities in 1888, as is described in the section of this report relating to private telephone lines.

III. GOVERNMENT OFFICIAL TELEPHONE SYSTEM.

The various departments and offices of the insular government in San Juan are not all located in the same building. As the governor, heads of departments, and other chief officials have need of constantly communicating with each other, the department of the interior in 1906 installed for the special use of the government a telephone system independent of that of the general telephone system of the city. This system now includes about 1 mile of wire and 15 instruments, bringing that number of offices into communication with each other. The cost of installing the system was approximately $500. The exchange, with a switchboard of 20 drops, is located in the office of the secretary of Porto Rico, the work of operator being performed by one of the employees of the office in addition to his other work.

Just as the insular government has found it desirable to establish a special telephone system to connect up the

several departments, so the military authorities have found it necessary to establish a special line to bring into communication with each other the various offices constituting the military post at San Juan. According to the report of the military officer commanding the post, this service now embraces an exchange, 29 installed instruments, and approximately 18 miles of wire. The value could not be given. This system, it may be stated, has connection with the city post office, the United States Naval Station, the United States Naval Hospital, the United States Weather Bureau, and the governor's house.

For purposes of completeness mention should be made of the fact that on December 13, 1902, a franchise was granted to the municipality of Guayama to construct and operate, for public purposes only, a telephone line between Guayama and Arroyo. No use was ever made of this franchise, and it was accordingly formally repealed by an ordinance enacted May 12, 1908.

IV. PRIVATE TELEPHONE SYSTEMS.

In order to make a complete showing of the extent to which use is made in Porto Rico of the telegraph and telephone as means of communication, mention should be made of the telephone systems that have been established by individuals or commercial houses for their private use. Such systems have been constructed in some cases in virtue of concessions or authorizations granted by the Spanish authorities and in others in virtue of franchises granted by the executive council. The ordinances of the executive council granting the permissions are in all cases in the nature of revocable permits, and they expressly provide that such lines shall not be thrown open to the use of the public for compensation and that the permits may be revoked at any time, and especially at such time as a general or public telephone system capable of performing the service may be established in the district. Practically the same provisions are found also in the Spanish concessions.

Following is an enumeration, with the more important data, concerning each case of a private telephone system now in operation in the island. Inasmuch as the executive council has taken the position that no franchise is required for the establishment of a private telephone line unless use is made in some way of public property, such as is involved where the lines cross public lands or cross or run alongside of a public road, it is possible that a few cases may exist where owners of sugar estates or other properties of considerable extent have installed private lines to connect up different points on their properties. It is certain, however, that such plants, if they exist, are of little monetary value or importance.

(1) On February 24, 1896, Messrs. Bertran Hermanos received from the Spanish governor-general permission to install a telephone line between their office in Humacao and their warehouses in Humacao Playa. This line was established and has continued in operation to the present time. The line now embraces 6 miles of poles and wires and 3 instruments, and is valued at $600. According to the terms of the concession the owners should pay to the government an annual royalty of $12 for each instrument installed.

(2) On December 28, 1888, Antonio Roig received from the Spanish authorities a concession, in all respects similar to the one granted to Bertran Hermanos, by which he was authorized to establish a private telephone line between his office in Humacao and Humacao Playa. This line was constructed at an estimated cost of $500 and has 6 miles of poles and wire and 2 instruments. As in the case of Bertran Hermanos, the concession calls for an annual payment to the government of $12 for each telephone installed. Mr. Roig has also recently established, without any concession, because presumably no use is made of public property, a line embracing 10 miles of poles and wires and 2 instruments, at a cost of $1,000, connecting his office in Humacao and the Juncos Sugar Central, in which he is largely interested.

(3) On August 30, 1904, the executive council granted a franchise to Messrs. C. & J. Fantauzzi to erect and operate a private telephone line to connect their main office at Arroyo Playa and their two plantations, Cuatro Calles in Arroyo and Felicita in Patillas. This line embraces 5 miles of poles and wires and 4 instruments, and cost $400.

(4) On August 2, 1906, the executive council granted a franchise to the Providencia Central Company to construct and maintain a private telephone line in connection with the operation of its central. The company has built this line which now connects its sugar central "Providencia" in Patillas, its central office at Arroyo Playa, and three of its plantations. The system embraces 6 miles of poles and wire and 5 instruments, and is valued at $1,000.

(5) On May 16, 1901, the executive council granted a franchise to Messrs. M. Zalduonado Veve & Santiago to maintain a private telephone system to connect various residences and places of business in Fajardo belonging to the Veve family. In pursuance of this franchise the concessionaries are now maintaining a system which embraces 9 miles of wire and 6 instruments, the total value of the system being about $1,200.

(6) The most important private telephone system in the island is that maintained by the Porto Rican Leaf Tobacco Company. This system has been established in virtue of an authorization granted by the executive council on October 31, 1904. The system is used by the company to enable it to keep in immediate communication with its various tobacco plantations, and embraces three central offices, one in Juncos with 10 instruments, one in Caguas with 6 instruments, and one in the La Plata valley with 7 instruments.

The three together thus include 23 instruments and the length of line is 34 miles. The cost of the system is estimated to be approximately $3,345.

(7) On June 30, 1901, the executive council granted a franchise to Luis M. Caballero to establish a private telephone line to connect his town residence with his country residence, both in Salinas. The concessionary has not availed himself of this franchise, though he states that he will probably do so in the immediate future.

(8) On April 29, 1902, the executive council granted a franchise to the Compañía de los Ferrocarriles de Puerto Rico and to Sobrinos de Ezquiaga, authorizing the latter to use the telegraph poles of the former for the purpose of connecting by telephone his place of business in San Juan with his sugar estate "Buena Vista" in Carolina. He has never availed himself of this franchise, which may therefore be considered a dead letter.

(9) The Puerto Rico Sugar Company, operating a sugar central known as "Pasto-Viejo" in Humacao, has established a private telephone line to connect its factory with Humacao, Humacao Playa, and the estate of Saldaña & Compañía, "Irurena." This system embraces 12 miles of poles and wires and 3 instruments, and is valued at $1,292. It does not appear that any formal authorization for the construction and operation of this line has ever been obtained.

ELECTRIC LIGHT, POWER AND TRACTION, AND STREET RAILWAY SYSTEMS.

I. SAN JUAN, RÍO PIEDRAS, AND CAGUAS.

Owing to the fact that San Juan, Río Piedras, and Caguas receive electric current for lighting and traction purposes from the same central plant, and that these towns are likewise connected by a railway system which, though at present operated partly by electricity and partly by steam, will shortly be operated wholly by the former power, it is desirable that the development and use of electricity in these towns and the surrounding district should be considered together.

The city of San Juan, the capital of the island, is a closely built town of about 30,000 inhabitants which, until a comparatively recent date, was surrounded for defensive purposes by a massive masonry wall. It is located on what appears to be a narrow promontory, but what in reality is an island, as a narrow channel, entering the basin of the harbor from the sea about a mile from the outskirts of the city, divides the land on which the city is located from the mainland. A single road, the only one connecting the city with the mainland, crosses this channel by a bridge. This road runs through the fairly populous ward or barrio, known as "Puerta de Tierra," just outside of the old city walls, crosses the bridge above mentioned, then traverses the suburban residential ward of Santurce which, since the American occupation, has increased rapidly in population. It then continues to the town of Río Piedras, about 12 kilometers from San Juan, to Caguas, 25 kilometers farther, and thence passing through other towns, crosses the island to Ponce, on the south coast, the second city in importance in the island.

San Juan has enjoyed the advantages of an electric lighting system since 1893. The conditions under which electric lighting plants might be established in the island were set forth in a royal decree of November 14, 1890. These conditions relate exclusively to the technical features of construction and installation to which the builder must conform. There does not appear to have been any effort made, such as is evident in the case of fixing the conditions under which telephone concessions would be granted, to treat electric lighting as a quasi public industry and as such to be rigidly controlled in respect to rates and conditions of service. No mention is made even of the term of years for which concessions might be granted, nor is any right reserved to the government to take over the plant and operate it as a public service should it ever be deemed desirable to adopt this policy. The concession for the electric light plant did, however, contain a provision to the effect that "this concession is limited in so far as the place and its military zones (plaza y sus zonas polémicas) are concerned to what has been established by the office of the captain-general to the effect that the concession shall not constitute any right of ownership, and that the work shall be destroyed on first notice received from the government of the place at the expense of the corporation and without any right to indemnification." It is difficult to determine the full purport of this provision, though probably it primarily related to the right of the government to take the action provided for in case military necessity should so dictate.

Complying with the provisions of the royal decree of March 14, 1890, application was made in 1893 by the Sociedad Anónima Luz Eléctrica to establish an electric lighting plant in San Juan, which application was granted by the governor-general of the island, with the provision above cited, February 15, 1893, and approved by the minister of Ultrama on May 22, 1893, and the system itself was constructed and put into operation later in the same year. This company is not a corporation, strictly speaking, but is what is known as a "mercantile association" registered under the provisions of the commercial code of Porto Rico. Its authorized stock is 63,500 pesos, all of which has been paid in, divided into 635 shares of 100 pesos each, the total par value of which at the present time in American gold would be $38,100. The plant itself, it should be stated, is worth much more than this sum of money. The concession was granted in the name of Don Mel-

quiades Cueto, director de la Sociedad Anónima Luz Eléctrica. One of the prime movers in organizing the enterprise, however, was Mr. Ramón Valdes, who, sometime prior to the American occupation, secured practically all of the shares of the association, so that he became in effect the sole owner and director of the concern.

This system has continued in operation without interruption until the present time, and has furnished the electric lighting for the greater part of the city. As will hereafter appear, efforts to consolidate in the same hands all of the electric lighting and traction companies in and about San Juan met with success in 1906, and all of the shares of the Luz Eléctrica were in that year acquired by the Porto Rico Power and Light Company, which was organized to utilize the water-power at Comerio falls for the purpose of supplying electric current for lighting and general power purposes. Pending the completion of this undertaking the plant of the Luz Eléctrica is still operated, though it is the intention of its present owners to discontinue its use in a short time and either dismantle it or hold it in reserve for emergencies and special service.

The Sociedad Anónima Luz Eléctrica apparently did not have an exclusive franchise for the lighting of the city, for, as will now be seen, another company was subsequently authorized to furnish electric light not only in the suburbs of Puerta de Tierra and Santurce, but in parts of the city itself.

On February 18, 1878, the Spanish Government granted a concession to one Pablo Ubarri y Capetillo to construct a steam tramway for the transportation of freight and passengers between the towns of San Juan and Río Piedras. This road was built in the following year and placed in operation. It follows closely, and in some cases actually lies upon, the right of way of the public road leading out of San Juan, that has been described. The Spanish concession under which this road was built was limited to sixty years' duration, and provided that at the expiration of that period the parts of the road lying on the highway, which, however, constitute but a small part of the total mileage, were to become the property of the government.

In 1900, while the island was still under the administration of the military authorities, American capitalists, either then or soon after represented by the firm of J. G. White & Co., of New York, conceived the idea of acquiring this property and franchise, of changing the gauge to the standard gauge of the United States—4 feet 8½ inches—of substituting electricity for steam as a motive power, of using the power plant that would have to be built to supply electric current to the public for lighting and power purposes, and of making other improvements and extensions. These parties accordingly secured from the military and the municipal authorities of San Juan permission to undertake this work. At the same time they obtained authority to lay tracks on additional streets of the city so that cars would enter the city by one route and leave by another, both of which would join the single track outside the limits of the city proper. As the entire line is a single track, the construction of this loop would much facilitate traffic operations. Some uncertainty exists in the minds of many in respect to the extent of the legal rights acquired by the parties in virtue of this concession of the military and municipal authorities, but it is not necessary to enter into any consideration of those questions here. The new civil government, established May 1, 1900, moreover, while never confirming the grant made by the military authorities, has never taken any steps to attack the validity of such grant or to interfere in any way with its utilization.

For legal reasons, into which it is not necessary for us here to enter, the capitalists interested deemed it best to organize two separate corporations to take over the enterprise. They accordingly created the two corporations known as the San Juan Light and Transit Company and the San Juan and Río Piedras Railway Company. The former was organized in the state of New York on April 14, 1899, and was authorized on June 8, 1904, to do business in Porto Rico. It has a capital stock of $500,000, all of which has been reported as paid in. Bonds bearing interest at the rate of 6 per cent per annum were also issued to the amount of $600,000. The latter company was organized in the state of New York on December 27, 1898, and authorized on June 8, 1901, to do business in Porto Rico. It has a capital stock of $300,000, all reported paid in. These two companies acquired all of the franchise rights and properties of the Ubarri concession. The San Juan Light and Transit Company was made the active managing company, while, so far as can be learned, the San Juan and Río Piedras Railway Company figures merely as the corporation in which, for legal reasons, is vested the ownership of that portion of the road lying on public lands. It was to the San Juan Light and Transit Company that the military government, as already stated, granted permission to change the gauge of the road, to substitute electricity for steam as a motive power, to build and operate an electric light and power plant, lay additional tracks in San Juan proper, construct and operate a spur to the sea front at Borinquen Park, etc. The franchise rights of this company have since been slightly enlarged by the executive council, which granted it permission to install certain switches to facilitate the operation of the road on a more frequent schedule. This company, the San Juan Light and Transit Company, from the date of the establishment of its electric power plant, has furnished current for the lighting of a part of the city proper and all of the current for the lighting of the suburbs of

Puerta de Tierra and Santurce, as well as the highway between these suburbs, and the town of Río Piedras.

From the entrance of the San Juan Light and Transit Company into the field of electric lighting and traction in San Juan, it was recognized that the work of supplying electric current in the district might be made much more economical and profitable if a consolidation could be effected of the plants of the Sociedad Anónima Luz Eléctrica and of the San Juan Light and Transit Company, or, better still, if the waterfalls of Comerio could be utilized for the generation of the current required. These falls, on the La Plata river, are located about 25 miles from the capital and are recognized to be the most valuable waterpower in the island. While the total horsepower capable of being developed has never been accurately determined, yet careful surveys and engineering investigations have demonstrated the certainty that sufficient power exists there for the development of electric current for all the probable needs of the cities of San Juan, Río Piedras, Caguas, Comerio, and a large number of smaller towns that it is feasible to reach by means of transmission lines.

The first move in the direction of the utilization of this waterpower was made by Mr. Ramón Valdes, the owner of the Sociedad Anónima Luz Eléctrica, who applied for, and on December 17, 1900, was granted by the executive council, a franchise to make use of these falls for the development and distribution of electric energy. Owing to legal difficulties encountered by Mr. Valdes, as a result of proceedings brought against him by the partnership of Arpin & Noble, who claimed ownership of a portion of the land that would have to be utilized, at or near the falls, Mr. Valdes was unable or unwilling to proceed with the work within the time called for by the franchise ordinance. The executive council, unwilling that the utilization of this valuable power should be delayed an indefinite number of years, after granting one extension of time within which the work might be undertaken or completed, revoked the franchise on July 21, 1902.

In taking this action referred to in the preceding paragraph, the executive council was influenced by the fact that it had pending before it an application for a franchise to construct an electric railway across the island from San Juan to Ponce, the prosecution of which was dependent upon the utilization of the Comerio falls for the generation of the power that would be required. This franchise was duly granted to the applicant—the Vandegrift Construction Company—on March 2, 1903. This company was a corporation organized in the state of New Jersey on December 20, 1899, and authorized on January 18, 1904, to do business in Porto Rico. Its capital stock was fixed at $100,000. For the ownership and operation of the road when completed the grantees of the franchise organized the Porto Rico Railway, Light, and Power Company, under the laws of the state of New Jersey, July 15, 1904, with a capital stock of $125,000, which company was authorized on July 28, 1904, to do business in Porto Rico. The Vandegrift Construction Company immediately began the work of surveying the route to be followed and pushed such work, in so far as the location of routes is concerned, to completion. After a beginning had been made in the work of grading at the San Juan end, the company, owing to its inability to finance the enterprise, was forced to discontinue work. The executive council, after granting several extensions of time, seeing the hopelessness of this line being built by the holders of the franchise, on February 24, 1905, repealed the franchise.

In 1905 a number of Canadian and American capitalists became impressed with the importance of the San Juan electric lighting and traction field, if existing undertakings could be brought under one management, and extensions of the field could be made in the way of building an electric line from Río Piedras to Caguas to connect with the San Juan Light and Transit Company line from San Juan to Río Piedras. The idea included also the development of the waterpower at Comerio falls and the furnishing of electric current for the lighting of a large number of towns that it would be feasible to reach by transmission lines. The running of a line to Caguas was deemed to be an enterprise offering especially great inducements. This town is located in the interior of the island, on the highway between San Juan and Ponce, about 25 miles from the former city, and is the starting point for branch roads running to the east coast and to other points, while it itself, in addition to having two large sugar centrals located near it, is the center of a rapidly growing tobacco industry. By a series of acts, an account of which follows, this plan of consolidation and development has been fully carried out by these parties. At the outset of the efforts looking to consolidation, the firm of J. G. White & Co., the owners of the San Juan Light and Transit and the San Juan and Río Piedras Railway companies, figured prominently. Subsequently, however, this firm disposed of its interests to its colleagues and, it is understood, has wholly retired from business in the island.

The first step in the direction of consolidation was the organization of the Porto Rico Power and Light Company for the purpose of acquiring the right to make use of the Comerio falls for the erection there of a central power plant to furnish all of the power that would be required by the other enterprises. This corporation was organized in the state of Maine on February 1, 1905, and was authorized on November 3, 1905, to do business in Porto Rico. The amount of its capital stock is said to be $750,000, of which all,

or practically all, is reported as paid in. On January 4, 1906, this corporation was granted a franchise by the executive council to develop the waterpower at Comerio falls for the production of electric energy, with the right to distribute and sell the current in San Juan and a large number of other municipal districts. The company proceeded vigorously with the work of construction and now has its plant in operation, and, moreover, is now prosecuting surveys and making plans looking to increasing the present capacity of the plant by the construction of additional dams and reservoirs for the storage of flood waters. If these plans are carried out, the capacity of the plant will be increased many times.

This company, as an essential part of its programme, acquired all of the stock of the Sociedad Anónima Luz Eléctrica and, as has been pointed out in the account of the operations of that company, intends to put the plant of the latter out of commission, or rather to hold it in reserve for the future.

The company has also made contracts with the San Juan Light and Transit Company by which the latter will surrender to the Porto Rico Power and Light Company its lighting business, and in turn take from the latter all the current needed by the San Juan Light and Transit Company for its traction business. In like manner power will be furnished to the Caguas Tramway Company operating the new railway line between Río Piedras and Caguas, as will be described hereafter. The company, finally, has made arrangements for furnishing electric light to a number of other towns, the most important of which are Comerio, Caguas, Río Piedras, Bayamón, and Cataño, in all which places it has contracts with the town authorities for the lighting of streets. As rapidly as possible the company also intends to enter the field of electric lighting in other places. It has thus become the one central power plant for the furnishing of electric power in what may be called the north central district of the island.

The second part of the programme for the consolidation and development of electric industries in the San Juan-Río Piedras-Caguas district consisted of the construction of an electric line from Río Piedras to Caguas, which would be in effect a continuation of the San Juan-Río Piedras line operated by the San Juan Light and Transit Company. On July 26, 1906, the executive council granted a franchise to J. G. White & Co., Inc., to construct and operate this proposed electric railway. This company was a corporation organized in the state of Maine on March 28, 1906, for the special purpose of receiving and making use of this franchise, and was authorized on July 2, 1906, to do business in Porto Rico. This company should not be confused with the firm of J. G. White & Co., of 43 Exchange place, New York, although at the time of its organization it was of course largely composed of and controlled by the members of that firm. As has been stated, the firm of J. G. White & Co. ultimately sold out all of its interests to its colleagues, the latter thus taking over both the ownership and operation of the San Juan Light and Transit and the San Juan and Río Piedras Railway companies, and the operation of the new electric railway when completed.

For the management of the latter enterprise the parties interested organized the Caguas Tramway Company. This company was organized in the state of Maine on July 25, 1907, and was authorized on August 20, 1907, to do business in Porto Rico. Its capital stock is $100,000. To it, with the consent of the executive council, was transferred the franchise that had been granted to J. G. White & Co., Inc. The road itself had in the meantime been constructed by J. G. White & Co., acting as contractors, and was completed and put into operation in June, 1908. At present, in virtue of a special permission granted by the executive council, this road is being operated by steam. The franchise, however, provides that the road must be electrified within a short time, and it is probable that this change in motive power will be made within a year or two. An account of the road should be properly included, therefore, in any description of electric traction enterprises in the island.

For the purpose of understanding the exact character of the franchise now enjoyed by the Caguas Tramway Company for the operation of a railway line between Río Piedras and Caguas, and the conditions under which this road must be operated, some account should be given of the circumstances under which the franchise was granted and the terms of the franchise itself.

At the time a new franchise was granted to the old Compañía de los Ferrocarriles de Puerto Rico to continue the operation of its system of steam railroads in the island and to make important additions to such system, the option was given to the railroad company, by provisions to that effect inserted in the franchise, to connect up its branch line, running from San Juan through Río Piedras to Carolina, with Caguas, by constructing a line joining the latter two points. The railroad company has always taken the position that the inclusion in the franchise of the option to construct this and other extensions was an important part of the consideration that induced it to surrender all rights and privileges that it claimed in virtue of the Spanish concession under which it was constructed and to accept the new franchise granted by the executive council on October 28, 1901, as a complete statement of its rights and obligations.

Immediately upon J. G. White & Co. making application in 1906 for the right to run an electric line from Río Piedras to Caguas, the American Railroad Company, successor or lessee of the Compañía de los Ferrocarriles de Puerto Rico, protested against the granting

of the franchise, inasmuch as, according to its claim, another company would be allowed to enter the field for the exploitation of which it had been granted a franchise. In connection with this protest it indicated its desire immediately to exercise the option and to extend its line to Caguas. In doing so, however, it desired to have the extension start from a point about two kilometers beyond Río Piedras on its route to Carolina instead of from Carolina itself, as the route would then be considerably shorter, would thus give a more direct line between San Juan, Río Piedras, and Caguas, and would meet with much more favorable engineering conditions.

About the same time the Porto Rican-American Tobacco Company, finding itself heavily interested in the matter of transportation between the towns of Caguas and San Juan, owing to its important tobacco interests lying at and beyond Caguas, likewise made application for the right to build a railroad between San Juan and Caguas. For this purpose the people interested in the tobacco company created the San Juan and Caguas Railway Company. This company was organized in the state of New Jersey on June 14, 1906, and was authorized on June 28, 1906, to do business in the island. Its capitalization was fixed at $300,000.

The tobacco interests professed that their main desire in applying for a franchise was to make certain that a road would be built. Consequently an agreement was reached between the American Railroad Company and the tobacco people by which the latter agreed to withdraw their application for a franchise. The other terms of this agreement can not be fully stated, but it is understood that important features were that the tobacco people would assist the railroad company in raising the necessary funds for making an extension of its road, and that the railroad company would undertake to transport the tobacco and other freight of the tobacco company upon terms satisfactory to the latter.

The executive council, after considering the two applications remaining pending before it—that of J. G. White & Co. for an electric road, and that of the American Railroad Company, lessee of the Compañía de los Ferrocarriles de Puerto Rico, for permission to make the extension from Carolina to Caguas, contemplated under its prior franchise, and to start at a point about two kilometers beyond Río Piedras instead of at Carolina—decided to grant both applications. Although the policy of the council in the past had always been to avoid the granting of competing franchises, it did not believe that this practice was being violated in the present case, inasmuch as not only would the two routes be slightly different, but that one was to be a steam and the other an electric railway, and in the opinion of the council the two roads would thus perform different industrial functions. Each applicant was given due notice of the fact that the application of the other likewise would be granted, and both applicants, with this knowledge, nevertheless accepted the franchises. The two were granted within a few days of each other, the one amending the franchise of the Compañía de los Ferrocarriles de Puerto Rico on July 19, 1906, and that to J. G. White & Co. on July 26, 1908.

It appears, however, that almost immediately after these two franchises had been granted and accepted the grantees realized that the two roads would, or might, compete very seriously with each other. They accordingly entered into negotiations with the result that, in consideration of a traffic agreement entered into between the two parties, the American Railroad Company obligated itself to J. G. White & Co. not to avail itself of the amendment to its franchise of July 19, 1906, and thus to leave the field to the latter party. The most essential feature of this traffic agreement was that the Río Piedras-Caguas Company would turn over at Río Piedras all of the freight originating on its line consigned beyond Río Piedras in the direction of San Juan, and that in like manner the American Railroad Company would turn over at the same point all freight originating with it and consigned to any point along the line of the Río Piedras-Caguas road. The two routes were to be physically connected at Río Piedras, so that through cars might be run from San Juan to Caguas, or vice versa. The agreement further provided that unless, or until, joint or through rates were agreed upon the sum of the two local rates should prevail, and that each road would take that part of the receipts corresponding to its local rates. If a joint rate should be agreed upon, then each road was to enjoy that part of the rate corresponding to the proportion of the total mileage represented by each road. This would give to the American Railroad Company a fraction over 29 per cent and to the Río Piedras-Caguas road a fraction over 70 per cent of the joint rate.

The franchise as originally granted has been amended in several respects and as now in force gives to the Caguas Tramway Company, the present holder of the franchise and operator of the road, the right to lay three rails so as to establish a double gauge, the one a meter gauge, corresponding to the gauge of the American Railroad Company, and the other a standard gauge of 4 feet 8½ inches, corresponding to the gauge of the San Juan Light and Transit Company. In this way the Caguas Tramway Company, operating in connection with the American Railroad Company and the San Juan Light and Transit Company, would be able to run freight cars, without reloading, directly through from Caguas to San Juan, or vice versa, by making use of the American Railroad Company's tracks, and through passenger cars between the same points by making use of the San Juan Light and

Transit Company's tracks, as its tracks would be physically connected with those of these two companies at Río Piedras.

To recapitulate relative to the situation in the San Juan district, there are now in existence the separate companies of the Sociedad Anónima Luz Eléctrica, the San Juan Light and Transit and the San Juan and Río Piedras Railway companies, the Porto Rico Power and Light Company, and the Caguas Tramway Company. All of the stock of the Sociedad Anónima Luz Eléctrica is held by the Porto Rico Power and Light Company, while the controlling interest in, if not all of the stock and to a large extent the bonds of, this and the other companies is owned by the group of Canadian and American capitalists to which reference has been made. To assist in financing the undertaking these capitalists have organized a company in Canada known as the "Porto Rico Railways Company." This company is not authorized to do business in the island, and it is not possible to state the exact way in which the securities of the various companies are owned. It is sufficient to state, however, that absolute control and management are vested in the same hands and that all the electric power required will be generated at the one central plant located at Comerio falls.

In respect to the matter of rates, the Sociedad Anónima Luz Eléctrica's charges in the past have been 15 cents per kilowatt hour for current furnished for electric lighting. Little current has been furnished for general power purposes, and where it has, the compensation has been specially agreed upon in each case. The charges of the San Juan Light and Transit Company for lighting purposes are 10 cents per kilowatt hour in San Juan and 15 cents per kilowatt hour in Río Piedras. The franchise granted to the Porto Rico Power and Light Company provides that the "charges and service shall be at all times subject to effective regulation by the government through the executive council," and that in no event shall the rates exceed the following maximum schedule: For lighting in the municipality of San Juan, 10 cents per kilowatt hour, and in places outside of that municipality, 15 cents per kilowatt hour; for power up to 10 horsepower, 10 cents per kilowatt hour; from 11 to 20 horsepower, 10 per cent discount; 21 to 40 horsepower, 15 per cent discount; 41 to 100 horsepower, 20 per cent discount; and 101 and over horsepower, 25 per cent discount. With the discontinuance of the plant of the Sociedad Anónima Luz Eléctrica the municipality of San Juan will be given a uniform rate for lighting of 10 cents per kilowatt hour. The company has also given the 10 cent rate to Río Piedras. In other towns the 15 cent rate has been applied.

The passenger rates of the San Juan Light and Transit Company are 5 cents between all points in San Juan proper and its barrios, or wards, of Puerta de Tierra and Santurce, including its branch line to the sea front at Borinquen Park. An additional 5 cents is charged for passengers going beyond a certain point on the road to Río Piedras. On the Caguas Tramway Line the rates now being collected are 5 cents per mile. The question of freight rates on both this line and the San Juan Light and Transit Company's line is now pending before the executive council for determination.

II. PONCE, MAYAGUEZ, ARECIBO, AND UTUADO.

The history of electric lighting and traction in Ponce, the second city in importance in Porto Rico, can be given briefly. As in San Juan the outcome has been the acquisition by the same parties of all of the various enterprises that have entered this field. In Ponce, however, it was possible to effect the consolidation in such a way as to center ownership and management in a single corporation and to allow all previously existing corporations to go out of business. On October 23, 1897, the Spanish Government granted a concession to an association known as the Compañía Anónima de la Luz Eléctrica de Ponce to establish a plant in the city of Ponce for the generation of current for electric lighting. This plant was constructed and was in operation at the time of the American occupation.

On February 27, 1901, the executive council of Porto Rico granted a franchise to W. S. H. Lothrop to construct and operate an electric railway in the city of Ponce and between that city and its seaport, the Playa of Ponce, about two miles distant. This franchise has been amended at various times to permit of the construction of switches or lines on other streets and to make certain other changes which it is not necessary to mention here. On April 1, 1902, a second franchise was granted to Mr. Lothrop to construct and operate an electric plant at Ponce for the generation of current for lighting and power purposes.

On May 22, 1902, and May 26, 1902, respectively, these two franchises were transferred to the Ponce Railway and Light Company, a company organized by, and since then constituting one of the railway and light properties of, the well-known firm of Stone & Webster, of Boston, Mass. This corporation was organized under the laws of the state of New Jersey on January 4, 1902, and was authorized on April 16, 1902, to do business in Porto Rico. Its capital stock is fixed at $50,000, although the value of the properties controlled by the company far exceeds this amount.

In 1903 the Compañía Anónima de la Luz Eléctrica de Ponce decided that it would prefer to hold its grant of power from the executive council of Porto Rico instead of from the grant or concession made to it by the Spanish authorities. It accordingly applied to the executive council for a franchise to authorize it to continue the production and sale of electric current for lighting and power purposes, which franchise was granted to it on October 12, 1903.

In Ponce, as elsewhere, it was recognized that unnec-

essary expense was involved in operating two plants for furnishing electric light for a city of the size of Ponce. The Ponce Railway and Light Company accordingly entered into negotiations with the Compañía Anónima de la Luz Eléctrica de Ponce for the purchase of its franchise and plant. These negotiations were successful and, with the approval of the executive council, the franchise of the Compañía Anónima de la Luz Eléctrica de Ponce was on August 30, 1904, transferred to the Ponce Railway and Light Company. This company has thus acquired possession of the two franchises relative to electric lighting and the one relative to a street railway. Upon the acquisition of the plant of the "Luz Eléctrica" the Ponce Railway and Light Company dismantled it and sold such of its machinery and equipment as was salable. The work of furnishing electric energy for the lighting of the city and the operation of the street railway is thus now performed by a single plant. The company now has outstanding capital stock to the amount of $50,000, a first mortgage of $150,000, and a second mortgage of $100,000.

Mayaguez is represented in the field of electric and street railway enterprise by one electric lighting and one street railway company. On February 21, 1896, a concession was granted by the Spanish Government to one Rafael Arrillaga, representing the Sociedad Anónima Compañía de Alumbrado Eléctrico, to construct and operate a plant for the furnishing of electric light in Mayaguez, and the plant was constructed in the same year in pursuance of such concession. After the American occupation the property of this company was acquired, first, by the Mayaguez Electric Company, a corporation organized under the laws of New Jersey on August 27, 1901, and authorized on November, 1902, to do business in Porto Rico, and later, in 1905, by the Mayaguez Light and Power Company, a corporation organized under the laws of Porto Rico on June 19, 1905, with a capital stock of $60,000. This company has since continued the operation of the plant. Owing to financial difficulties, however, in the early part of 1908 it was forced into the hands of a receiver, and is now being operated by the receiver under the order of the court.

On July 14, 1893, the Spanish authorities granted a concession for the construction and operation of a street railway to be operated by horsepower in the city of Mayaguez. This concession was granted to Messrs. Joaquín Gisbort and Guillermo Quintanilla, but the system which was immediately constructed is now owned and operated by the Sociedad Anónima Tranvía de Mayaguez.

In Arecibo the establishment of a municipal electric lighting plant grew out of the steps taken by that city for the creation of a waterworks system. The plan of constructing an aqueduct and of distributing the water through a system of pipes was conceived in 1896. The engineer to whom the work was intrusted reported that a waterpower near the city in the Tanama river could be used for the generation of power sufficient both to operate a pump for furnishing water to the reservoir and to operate a dynamo for the production of electric light. These plans of the engineer were adopted, but it was not until 1903 that the work was completed and put in operation. The delay in putting the plans into execution was due to the difficulty encountered by the city in securing the necessary funds. Such funds were finally secured through the sale of bonds to the amount of $100,000 for the purpose of making this and other improvements. Since the first construction various improvements have been made in the plant, chiefly because the machinery originally installed was of insufficient power to perform the services demanded of it. The total cost of the plant to date is placed at $21,884. It furnishes light both for streets and public buildings and for private consumers.

The town of Utuado, situated in the municipal district of the same name, contains an electric lighting plant that was installed in 1897 by the firm of Casellas & Co. In 1904 the property was transferred to the firm of Lopez, Villamil & Co., which firm is now in process of liquidation. The plant is operated by a 30-horsepower turbine water wheel, whence it can be seen that the undertaking is conducted on a very small scale.

Yauco is the only town in the island, in addition to those that have been mentioned, in which efforts have been made looking to the establishment of a plant for the furnishing of electric light. On June 28, 1904, the executive council granted a franchise to La Compañía Eléctrica de Yauco to construct and operate an electric light and power plant in that city. This company purchased the machinery formerly owned by the Compañía Anónima de la Luz Eléctrica de Ponce, after the franchise and plant of that company were acquired by the Ponce Railway and Light Company. After the plant was installed in Yauco, however, it ran for only a short time, and the company is now in the hands of a receiver, with its plant shut down.

In the foregoing an account has been given of all enterprises that have been established in Porto Rico coming within the scope of this report. Mention should again be made, however, of the fact that, owing to the development of Comerio falls for the generation of electrical current by the Porto Rico Power and Light Company, a considerable number of towns that do not have electric plants of their own will be able to enjoy the advantages of electric light and power. Among such towns are Caguas, Carolina, Río Piedras, Bayamón, Cataño, and Comerio, while if the company carries out its plans of making a still further use of the water of the river La Plata, at or near Comerio, it will undoubtedly be able to furnish electric power to a number of other towns and enterprises. The parties owning this plant and the San Juan electric lighting and

traction enterprises now have pending before the executive council an application for a franchise to extend their system of railways now running from San Juan to Caguas from the latter point down the Naguabo valley to the east coast.

III. SUGAR CENTRALS' ELECTRIC LIGHT AND POWER PLANTS.

This report is not intended to present a complete showing of the extent to which use is made of electric power in Porto Rico. It is worth while in concluding, however, to note that practically all of the more important sugar centrals have in operation electric plants for the lighting of their works and the performance of certain parts of their industrial operations. In a number of cases, and notably that of the Guanica central, these plants are of considerable magnitude, and embrace machinery and methods corresponding to the most advanced system of electrical installation and operation.

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