

HISTORY OF THE DEVELOPMENT AND ACTIVITIES
OF THE
POTOMAC ELECTRIC POWER COMPANY
IN MARYLAND

GREGG McCLURG

Presented As Requirement
For Initiation
Maryland Beta Chapter
Tau Beta Pi Association

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SUMMARY

The Potomac Electric Power Company is the sole successor to several previous enterprises, dating from 1881. Incorporated in 1896, it bought out its two competitors and built the present Bennings plant in 1906. Extensions into nearby Maryland were made early in the present century, many of the first lines being carried on the poles of the Washington Railway & Electric Company's Maryland routes. Service to more distant rural towns has been developed recently, in order to utilize increased plant capacity. The recent increased efficiency at Bennings has resulted in rates less than half of those prevailing in 1924.

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ORIGIN OF THE COMPANY

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Washington, D. C. was incorporated under the laws of West Virginia on October 17, 1882, the original capital stock issue of \$100,000 being used to buy out the Heisler Electric Company and subsequent issues bringing the capitalization up to \$1,097,600. The new corporation began business on a large scale; contracts were made with the United States Electric Lighting Company of New York for the use of electrical patents and underground conduits laid on Pennsylvania Avenue and adjacent streets.

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The outgrowth of the Company's lines into that part of Maryland which is suburban to Washington, D. C. came as a natural consequence of the concentration of population along street car lines of the Washington Railway and Electric Company, of which the Potomac Electric Power Company is a subsidiary. In the days before the universal use of the automobile, suburban sections along street railway lines became populated more rapidly than territory nearer Washington but without railway facilities. Many of the Company's oldest substations were established primarily for railway purposes and later adapted to supply the needs of residential lighting. The Glen Echo, Rockville, Georgia Avenue, and Laurel lines of the Washington Railway and Electric Company provided gateways into Maryland in four directions; it was comparatively easy to string additional power wires on the poles already existing. Feeder #27 was extended to SUB 4, Riverdale, in 1904 for railway purposes, and by 1906, Hyattsville had a small lighting installation. The year 1906 also saw the first important lighting load connected at Rockville, although street lighting did not come until considerably later. By 1909,

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In contrast with the early developments in suburban Maryland, a large percentage of the extensions to rural towns, especially those at relatively distant points, have been completed within the past ten years. As these extensions are intimately connected with recent rapid expansion at Bennings, coupled with increased plant efficiency, they will be considered in the following paragraphs.

RECENT DEVELOPMENT OF EQUIPMENT

In every respect, the past ten years has been the most remarkable period in the Company's history. Although population in the territory served has increased only 32.1% during the years 1918-1928, the Bennings investment has increased 256.5%, the peak load 130.2%, and the total output 134.5%. This greater consumption per capita has resulted in a much larger income for the Company, and installation of modern equipment has raised the efficiency of the plant; longer transmission lines have been built into Maryland to

utilize the increased capacity. The following excerpts from the Company's official reports, 1920-1928, show the rapid expansion, especially in rural lines.

An important street lighting extension in Rockville was completed in 1920, when 100 lamps were installed; 530 poles and 171,901 feet of wire were added in Maryland.

During 1922 a new 12,500 K. W. turbo-generator was put in service at Bennings, replacing an older 9000 K. W. machine; 103 street lamps, 756 poles and 639,743 feet of wire were installed in Maryland.

The year 1923 saw the first operation of a new 60 cycle automatic substation, #22, located at the rear of Cathedral Mansions and carrying a heavy lighting load to Chevy Chase and northern Washington. Maryland additions included 1222 poles, 756,333 feet of wire, and 111 lamps.

In 1924 a 20,000 K. W. 60 cycle turbo-generator and three 1,400 H. P. boilers were installed at Bennings at a cost of \$1,860,000. The Riverdale substation was changed to 4,000 v., a 13,200 v. line extended from Bennings to SUB 4, Riverdale, and new overhead construction completed to Ammendale, Beltsville and Wheaton, Maryland.

The official report for 1925 shows that a 13,200 v. feeder was put in service between SUB 5, Brightwood and Sligo, Maryland. Extensions were also made to Forestville and Potomac, Maryland.

During 1926, in order to provide more reliable and economic service to the towns of Rockville, Gaithersburg,

and vicinity, a new substation, #24, was built near Rockville, and the service and customers' equipment changed from 25 to 60 cycles, two 13,200 v. lines feeding over different routes. In addition, 13,200 v. feeders were completed from Bennings to SUB 24, Riverdale; from High Street, Sligo to SUB 24, Rockville; and from SUB 24 to SUB 23, Tennallytown. Gaithersburg was connected to SUB 24 by a 4000 v. line. An extension of 9.1 miles was made to Upper Marlboro and the voltage raised part of the way from 4,000 to 13,200.

In September 1927 the first high pressure, high temperature 30,000 K. W. turbo-generator, with 15,000 K. W. frequency changer, was placed in operation at Bennings. Service was established from SUB 4 to Melrose, Maryland and from SUB 23 to Alta Vista, Maryland at 4,000 v. The territory served by the Potomac Electric Power Company was enlarged to Marlboro and preliminary work started to Olney and Laytonsville, according to an agreement with the Potomac Edison Company and the Consolidated Gas, Electric Light and Power Company. A new 60 cycle substation was opened at Sligo, new feeders installed and substations #12, #22, and #23 changed from 2400 to 4000 v.

Continued operation of the new turbine during 1928 increased the efficiency of the plant from 1.542 to 1.412 pounds of coal per kilowatt-hour, saving \$119,170.94. The gross output was increased 10.9% by increasing the coal consumption only 1.3%, due to the greater efficiency of the machine. On October 20, 1928 the first 33,000 v. transmission

line was placed in operation between Bennings, Riverdale and Brightwood. A total of 81.6 miles of rural lines were constructed in Maryland, including a 17.2 mile, 13,200 v., three phase, 60 cycle extension from Bennings to Piscataway Creek, Maryland, where energy is sold to the Suburban Electric Power Company. The other towns added are: Olney, Brookville, Laytonsville, Avenal, Clinton, Sandy Springs, Germantown, Layhill, and Camp Springs.

RATES

On March 3, 1899 an Act of Congress reduced the rates on electrical energy from 15¢ to not over 10¢ per kilowatt-hour, and the price of 10¢ prevailed for many years. Recently, however, due to increased income and plant efficiency, the Company has reduced its rates to less than half this value, as the following figures show:

For the first 120 kilowatt-hours (lower rates on consumption per month exceeding this value):

1924 - - - - -	10¢
1925 - - - - -	7.5¢
1926 - - - - -	7¢
1927 - - - - -	6.25¢
1928 - - - - -	5.9¢

In 1929 a straight rate of 5.2¢ was established, with the alternative of 5.9¢ for the first 120 kilowatt-hours and 4.5¢ for all additional consumption. The flat rate for 1930 is 4.7¢ per kilowatt-hour.

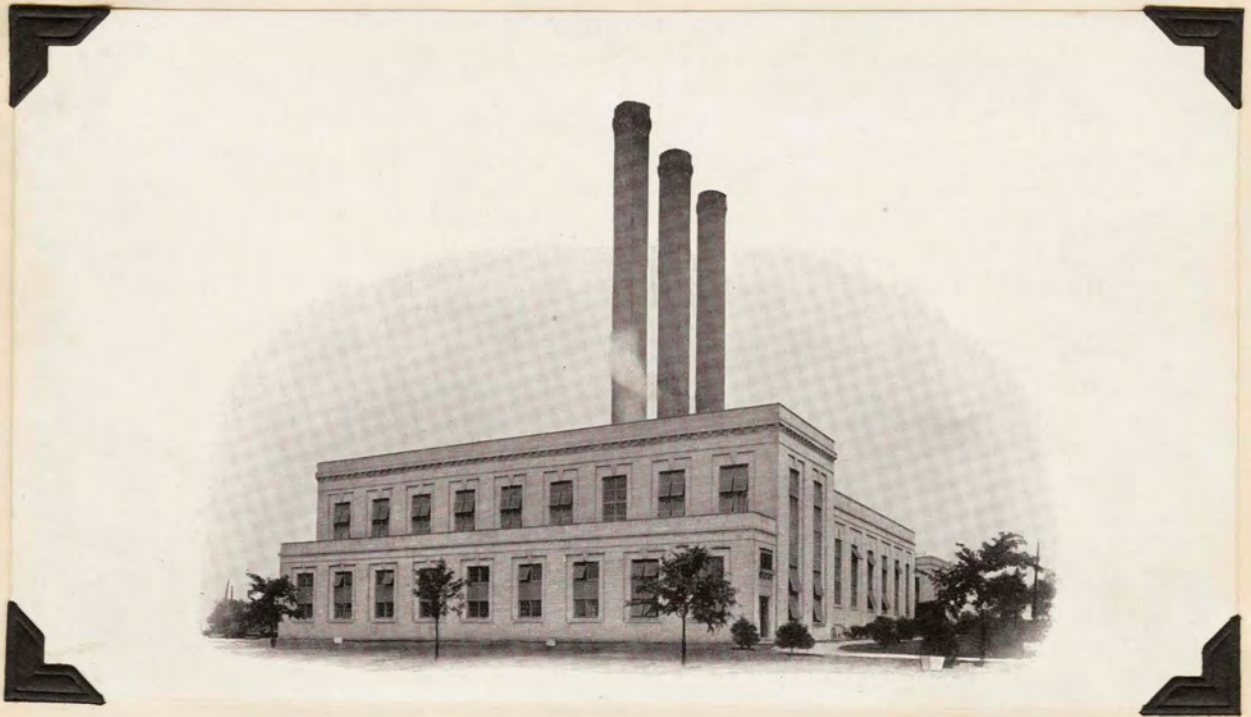
BIBLIOGRAPHY

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Standard History of the City of Washington. - Tindall
Report of the U. S. Senate Committee on the District of
Columbia; Electric Lighting - 1896
Transportation Survey of 1925; Report to Public Utilities
Commission - McClellan and Junkersfeld
Brief of Counsel for the Potomac Electric Power Company;
Formal Case No. 47 Before the Public Utilities Commission
The Evening Star - 1907-1929 inclusive
Annual Reports of Potomac Electric Power Company, 1920-1928
Personal Interviews with the Following Potomac Electric
Power Company Officials:
Mr. Schaefer - Commercial Engineering Department
Mr. Sharpe - Executive Assistant to the President
Mr. McNally - Assistant to Mr. Sharpe
Mr. Smirnoff - Statistician
Mr. Lank - Engineer, Substation Department
Mr. Keyser - Secretary

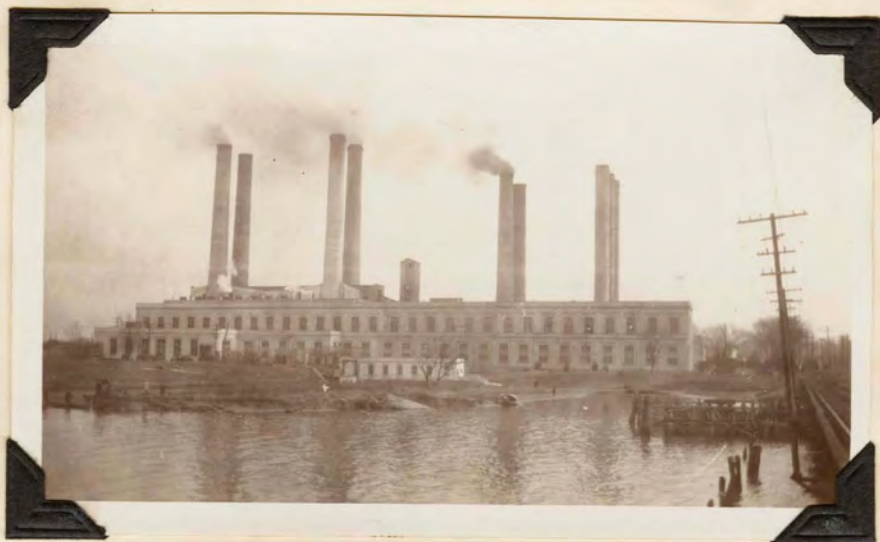
BENNINGS POWER PLANT

This section comprises photographs of the plant and equipment, operating data, and statistics showing development since the beginning of operation in 1907. During the years 1907-1928, the total investment has been increased to more than ten times its original value; the present capacity is 178,000 K. W.

DEVELOPMENT AT BENNING



EARLY PHOTOGRAPH



JAN. 1, 1930



AUTOMATIC
ASH REMOVAL
WITH
ELECTRIC TRAINS



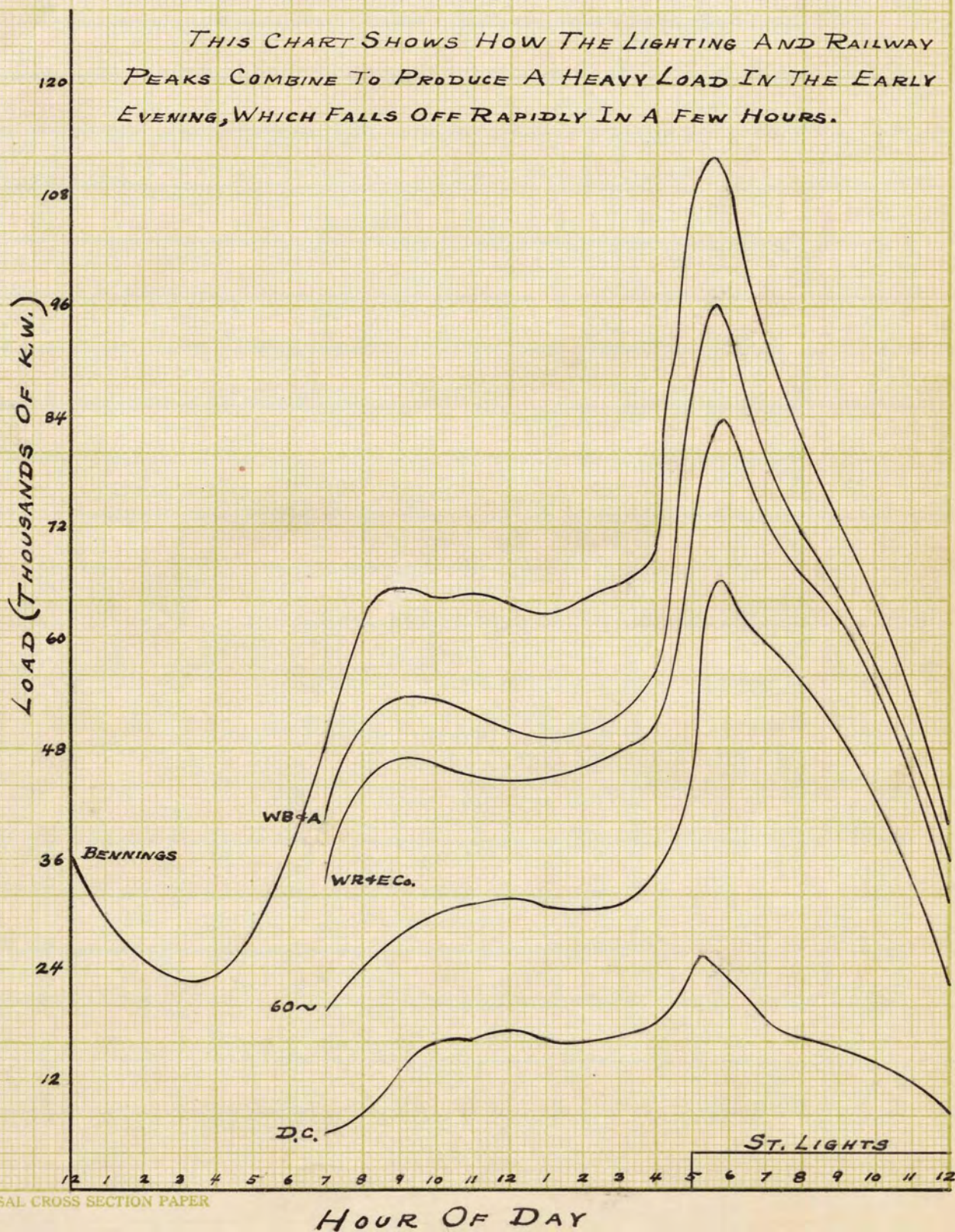
SUB 14
BENNINGS

ONE 1000 K.W. 600 V. R.W.Y. CONVERTER
ONE 500 K.W. 600 V. R.W.Y. CONVERTER
TWO 1000 K.V.A. 13.2/4 K.V. 60 ~ TRANS.

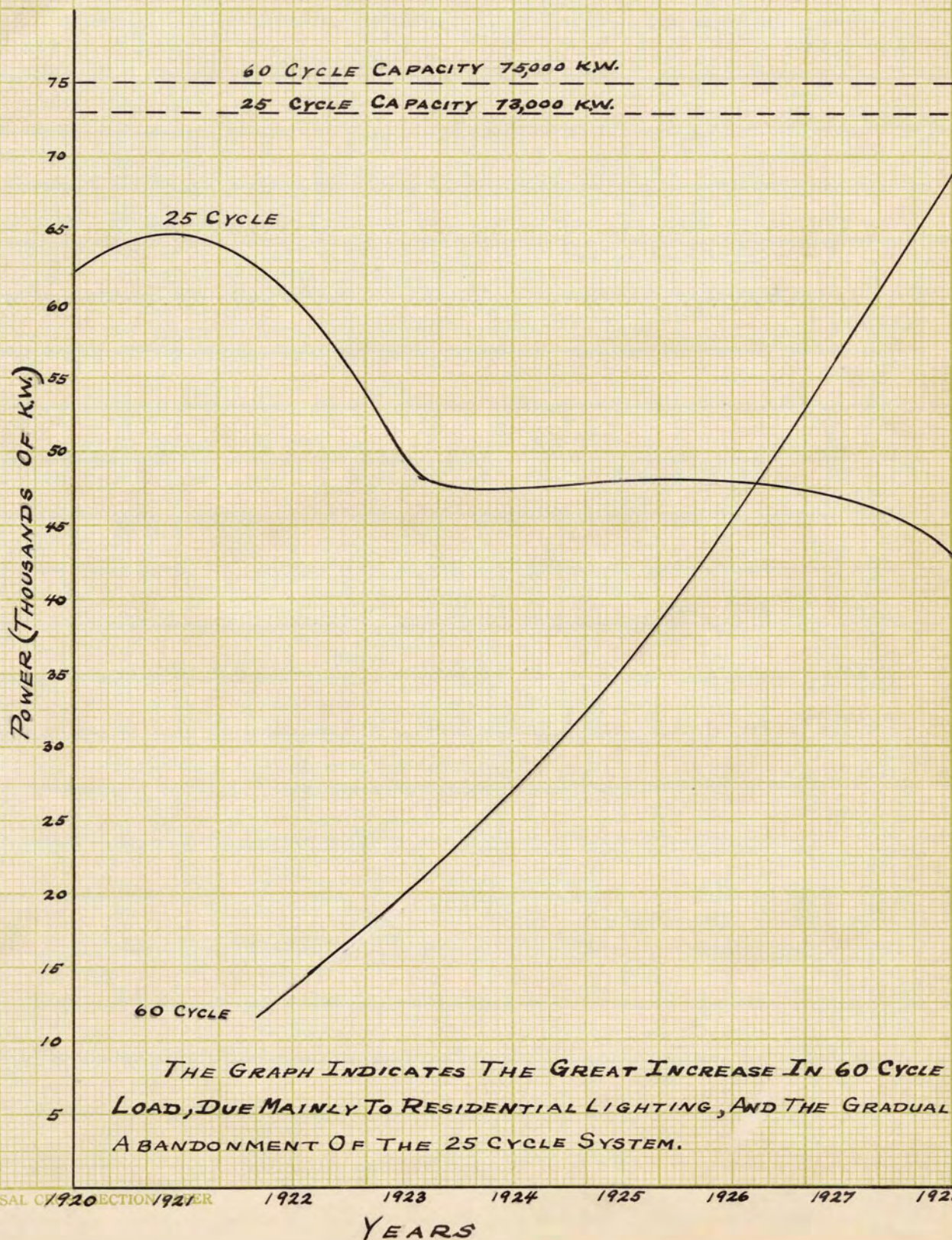
BENNINGS PEAK DAY

Nov. 26, 1928

THIS CHART SHOWS HOW THE LIGHTING AND RAILWAY
PEAKS COMBINE TO PRODUCE A HEAVY LOAD IN THE EARLY
EVENING, WHICH FALLS OFF RAPIDLY IN A FEW HOURS.



BENNINGS GENERATED PEAKS 25 AND 60 CYCLE

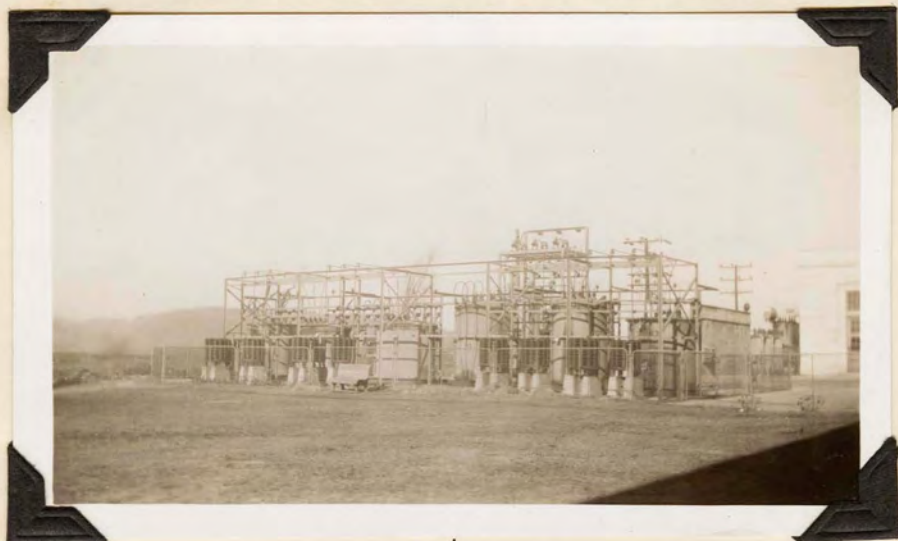


MARYLAND DISTRIBUTION SYSTEM

The following photographs illustrate the Company's network of feeders and substations, either in Maryland or serving Maryland directly. The pictures are arranged in geographical sequence, with electrical connections shown by the inked lines; feeder numbers may be followed on the high tension feeder diagram and the location of substations on the map of territory served, both of which are included at the end of this thesis.

BENNINGS

10,000 K.V.A. 13.2/33 K.V. 60~ TRANS.



78

33,000 v.



78

33,000 v.

ALONG
KENILWORTH AVENUE

78
33,000 v.



SUB 4

RIVERDALE

TWO 300 K.W. 600V. R.WY. CONVERTERS
ONE 500 K.W. 600V. R.WY. CONVERTER
THREE 1000 K.V.A. 13.2/4 K.V. 60~ TRANS.

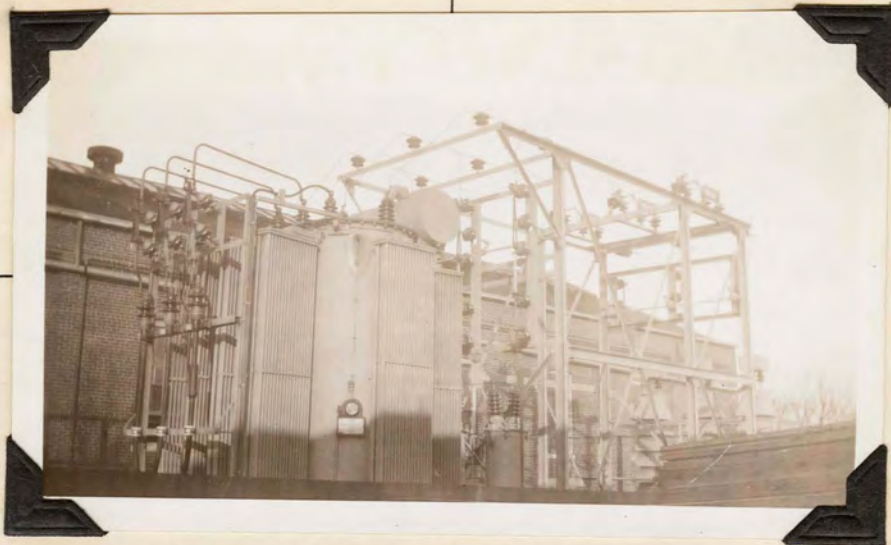
78
33,000 v.



78
33,000 v.

TURN INTO
AGER ROAD

78
33,000 v.



SUB 5

BRIGHTWOOD

TWO 500 K.W. 600 V. R.W.Y. CONVERTERS
ONE 10,000 K.V.A. 33/13.2 K.V. 60 ~ TRANS.
THREE 1,000 K.V.A. 13.2/4 K.V. 60 ~ TRANS.
ONE 2,000 K.V.A. 13.2/4 K.V. 60 ~ TRANS.

79
13,200 v.



79
13,200 v.

NORTH ON
GEORGIA AVENUE

28
13,200V. 25~



SUB 6
MONTROSE

#28
13,200V.

TWO 300 K.W. 600 V. R.W.Y. CONVERTERS
ONE 300 K.V.A. 6.6/13.2 K.V. 60~TRANS.



28
TO SUB 12

ALONG ROCKVILLE CAR LINE



#74
13,200 V. 60~

DOWN WISCONSIN AVENUE

#74
13,200V.

79
13,200 v.



SUB 24
ROCKVILLE

ONE 1000 KVA. 13.2/4 K.V. 60~TRANS.

ONE 500 KVA. 13.2/4 K.V. 60~TRANS.

74
13,200 v.

To
SUB 23

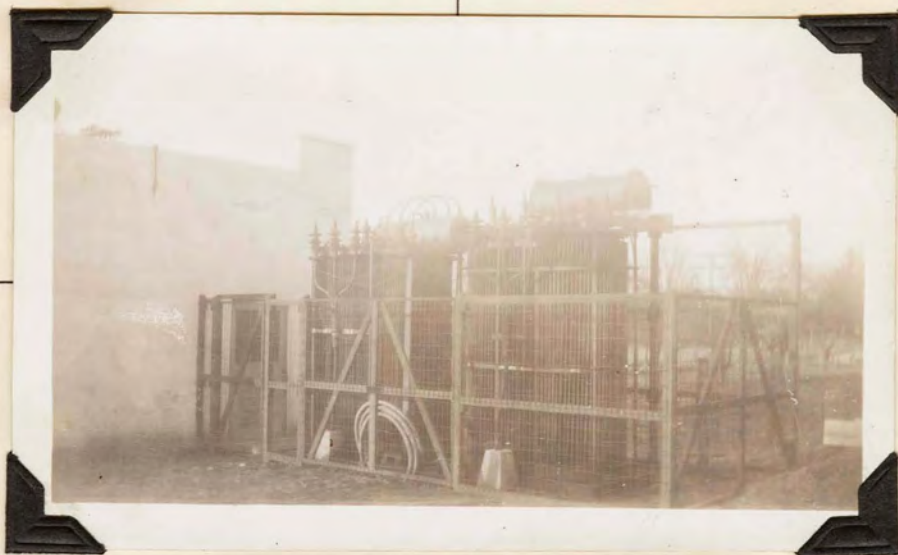
28
13,200 v.



#28
25~

ALONG ROCKVILLE
CAR LINE

79
13,200 v.



SUB 9

SLIGO

TWO 1000 K.V.A. 13.2/4 K.V. 60~ TRANS.

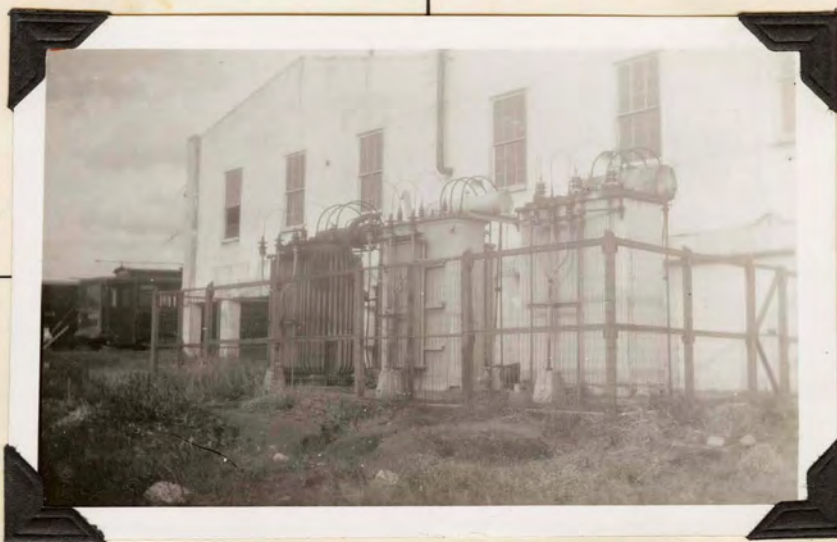
79
13,200 v.



79
13,200 v.

THROUGH
KENSINGTON

74
13,200v.



SUB 23
TENNALLYTOWN

TWO 1,000 K.V.A. 13.2/4 K.V. 60~ TRANS.
ONE 2,000 K.V.A. 13.2/4 K.V. 60~ TRANS.

72
13,200v. 60~



72
13,200 v.

SOUTH ON
WISCONSIN AVENUE

#72
13,200 v.

#29
6600v. 25~



SUB 12
GEORGETOWN

THREE 2500v. FREQ. CHANG., TOTAL 2000 KVA.
ONE 4000 v. FREQ. CHANG. OF 1,000 KVA.
TWO 500 KW. 600 v. Rwy. CONVERTERS
TWO 1500 KVA. 6.6/13.2 KV. 25~ TRANS.
ONE 1000 KW. 600v. Rwy. CONVERTER
TWO 1000 KVA. 13.2/4 KV. 60~ TRANS.
ONE 2000 KVA. 13.2/4 KV. 60~ TRANS.



#29
6,600v.



#60
4,000v.
To
CABIN
JOHN

CHANGE FROM UNDERGROUND
TO OVERHEAD TRANSMISSION

SUB 15
GLEN ECHO
ONE 500 KW. 600v. Rwy. CONVERTER

MARYLAND CUSTOMERS

The photographs in this section indicate the equipment now in use by some of the Company's more important Maryland customers, chiefly for power purposes.

UNIVERSITY OF MARYLAND



OUTDOOR SWITCHING
AND METERING HOUSE



25~ POWER FOR
DAIRY BUILDING



AMERICAN
ICE COMPANY
BETHESDA



HYATTSVILLE ICE AND FUEL CO.
HYATTSVILLE

WASHINGTON SUBURBAN
SANITARY DISTRICT



HYATTSVILLE



BURNT MILLS

SUBURBAN ELECTRIC
POWER COMPANY
OF
SOUTHERN MARYLAND



TAP TO P.E.P. Co.
PISCATAWAY CREEK



3 ϕ TRANSFORMERS
PISCATAWAY CREEK

ROCKVILLE
FAIR GROUNDS



ROCKVILLE
ICE COMPANY



WASHINGTON RAILWAY
AND ELECTRIC COMPANY



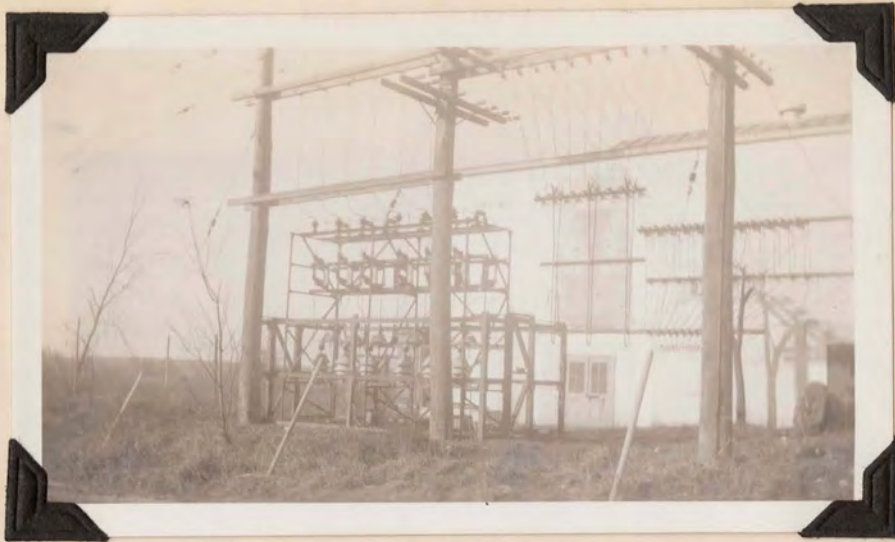
WASHINGTON BALTIMORE AND ANNAPOLIS
ELECTRIC RAILROAD CO.



TYPES OF EQUIPMENT

Recent installations of modern equipment are shown in the following pages. The protected outdoor-type transformer used at SUB 22 will be a model for future development.

LIGHTNING ARRESTERS
AND H.T. WIRING



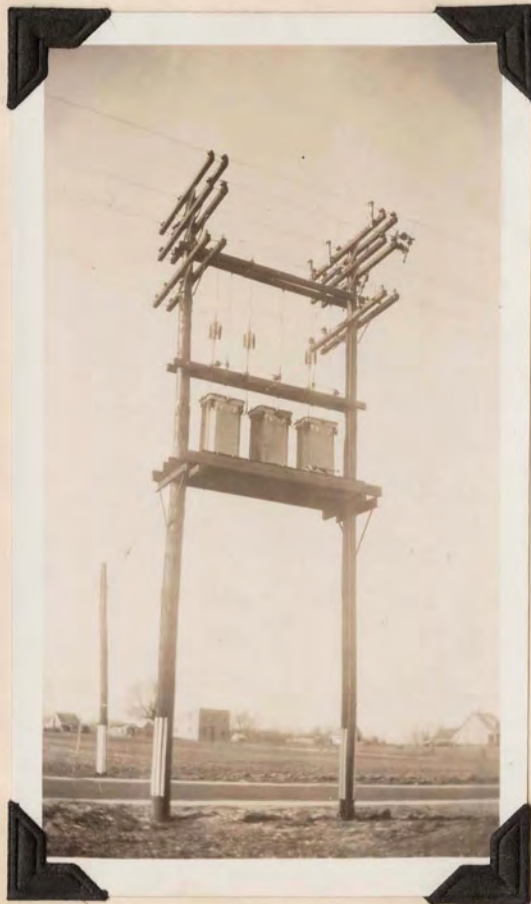
TENNALLYTOWN CAR BARN



STRAIN INSULATION AT RR. CROSSINGS AND TURNS.
#78 BETWEEN BENNING AND SUB4

SUB 22

REAR OF CATHEDRAL MANSIONS



LOCAL LIGHTING TRANSFORMERS

SOUTHERN MARYLAND

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An important street lighting extension in Rockville was completed in 1920, when 100 lamps were installed; 530 poles and 171,901 feet of wire were added in Maryland.

During 1922 a new 12,500 K. W. turbo-generator was put in service at Bennings, replacing an older 9000 K. W. machine; 103 street lamps, 756 poles and 639,743 feet of wire were installed in Maryland.

The year 1923 saw the first operation of a new 60 cycle automatic substation, #22, located at the rear of Cathedral Mansions and carrying a heavy lighting load to Chevy Chase and northern Washington. Maryland additions included 1222 poles, 756,333 feet of wire, and 111 lamps.

In 1924 a 20,000 K. W. 60 cycle turbo-generator and three 1,400 H. P. boilers were installed at Bennings at a cost of \$1,860,000. The Riverdale substation was changed to 4,000 v., a 13,200 v. line extended from Bennings to SUB 4, Riverdale, and new overhead construction completed to Ammendale, Beltsville and Wheaton, Maryland.

The official report for 1925 shows that a 13,200 v. feeder was put in service between SUB 5, Brightwood and Sligo, Maryland. Extensions were also made to Forestville and Potomac, Maryland.

During 1926, in order to provide more reliable and economic service to the towns of Rockville, Gaithersburg,

and vicinity, a new substation, #24, was built near Rockville, and the service and customers' equipment changed from 25 to 60 cycles, two 13,200 v. lines feeding over different routes. In addition, 13,200 v. feeders were completed from Bennings to SUB 24, Riverdale; from High Street, Sligo to SUB 24, Rockville; and from SUB 24 to SUB 23, Tennallytown. Gaithersburg was connected to SUB 24 by a 4000 v. line. An extension of 9.1 miles was made to Upper Marlboro and the voltage raised part of the way from 4,000 to 13,200.

In September 1927 the first high pressure, high temperature, 30,000 K. W. turbo-generator, with 15,000 K. W. frequency changer, was placed in operation at Bennings. Service was established from SUB 4 to Melrose, Maryland and from SUB 23 to Alta Vista, Maryland at 4,000 v. The territory served by the Potomac Electric Power Company was enlarged to Marlboro and preliminary work started to Olney and Laytonsville, according to an agreement with the Potomac Edison Company and the Consolidated Gas, Electric Light and Power Company. A new 60 cycle substation was opened at Sligo, new feeders installed and substations #12, #22, and #23 changed from 2400 to 4000 v.

Continued operation of the new turbine during 1928 increased the efficiency of the plant from 1.542 to 1.412 pounds of coal per kilowatt-hour, saving \$119,170.94. The gross output was increased 10.9% by increasing the coal consumption only 1.3%, due to the greater efficiency of the machine. On October 20, 1928 the first 33,000 v. transmission

line was placed in operation between Bennings, Riverdale and Brightwood. A total of 61.6 miles of rural lines were constructed in Maryland, including a 17.2 mile, 13,200 v., three phase, 60 cycle extension from Bennings to Piscataway Creek, Maryland, where energy is sold to the Suburban Electric Power Company. The other towns added are: Olney, Brookville, Laytonsville, Avenal, Clinton, Sandy Springs, Germantown, Layhill, and Camp Springs.

RATES

On March 3, 1899 an Act of Congress reduced the rates on electrical energy from 15¢ to not over 10¢ per kilowatt-hour, and the price of 10¢ prevailed for many years. Recently, however, due to increased income and plant efficiency, the Company has reduced its rates to less than half this value, as the following figures show:

For the first 120 kilowatt-hours (lower rates on consumption per month exceeding this value):

1924	- - - - -	10¢
1925	- - - - -	7.5¢
1926	- - - - -	7¢
1927	- - - - -	6.25¢
1928	- - - - -	5.9¢

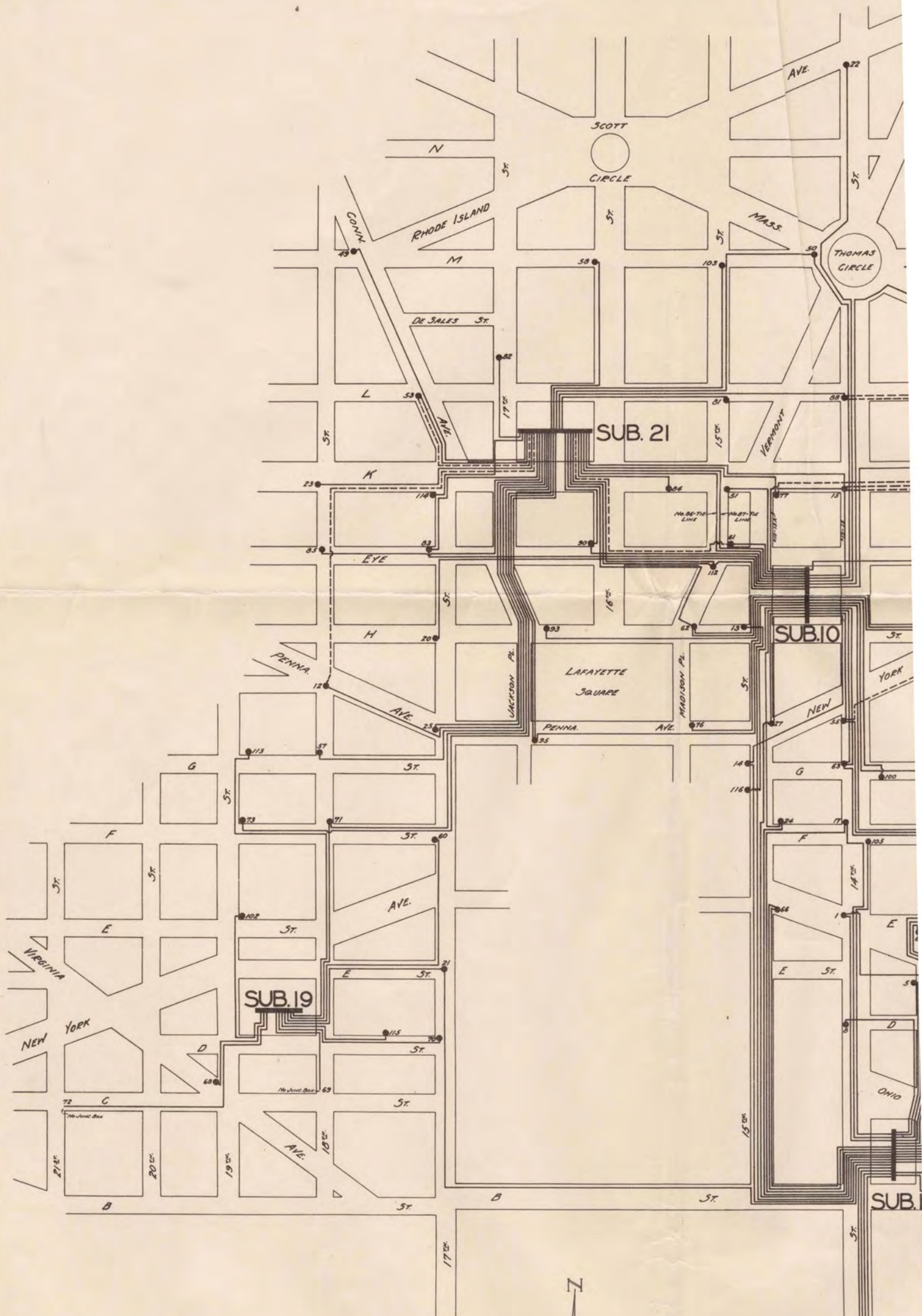
In 1929 a straight rate of 5.2¢ was established, with the alternative of 5.9¢ for the first 120 kilowatt-hours and 4.5¢ for all additional consumption. The flat rate for 1930 is 4.7¢ per kilowatt-hour.

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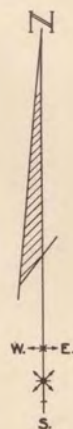
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Personal Interviews with the Following Potomac Electric
Power Company Officials:
Mr. Schaefer - Commercial Engineering Department
Mr. Sharpe - Executive Assistant to the President
Mr. McNally - Assistant to Mr. Sharpe
Mr. Smirnoff - Statistician
Mr. Lank - Engineer, Substation Department
Mr. Keyser - Secretary







-LEGEND-
— EXISTING
--- PROPOSED



TAP TO MONUMENT
TAP TO MAINS

OLD BUREAU OF
ENGRAVING AND
PRINTING
SUB 17

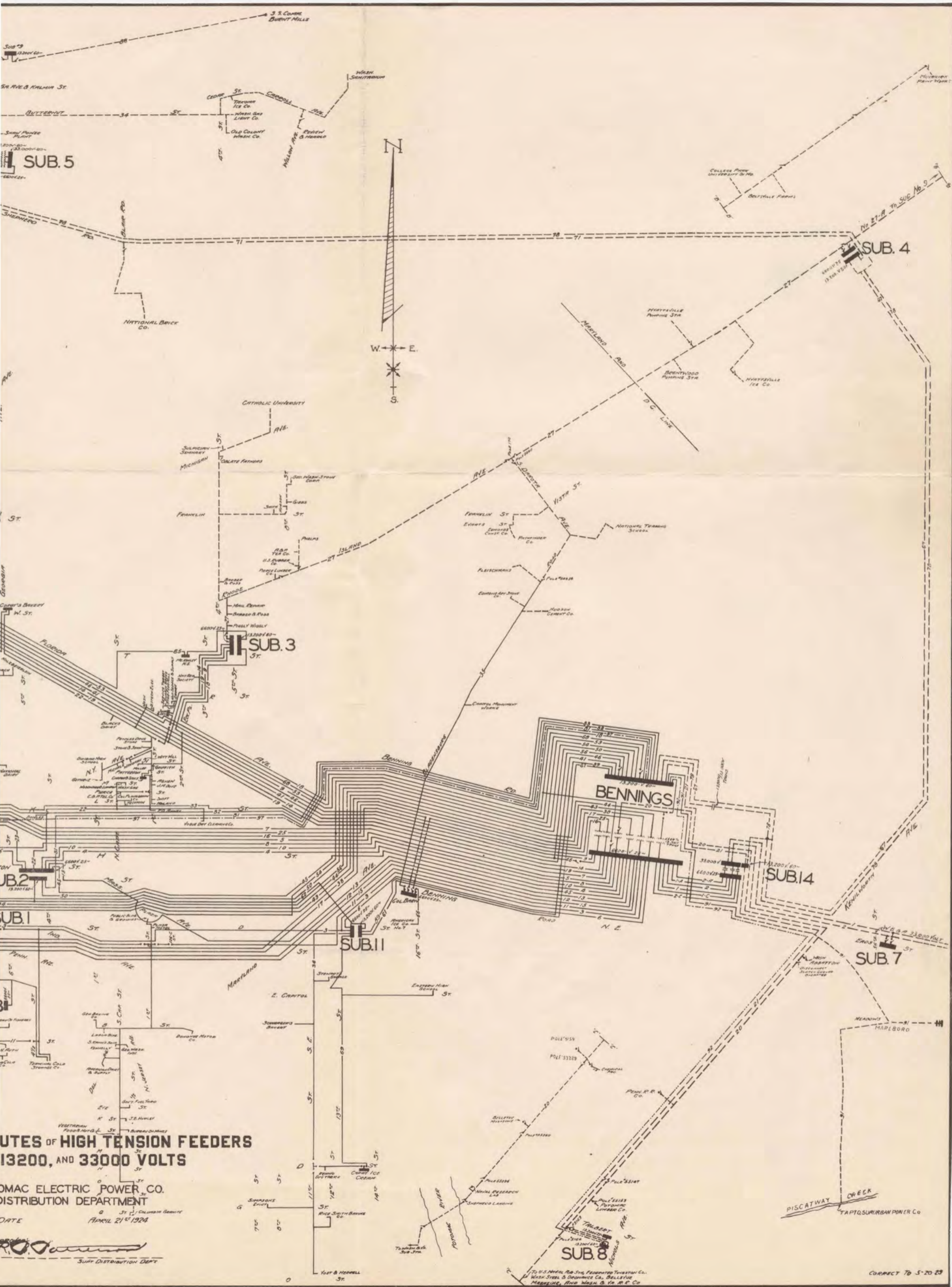


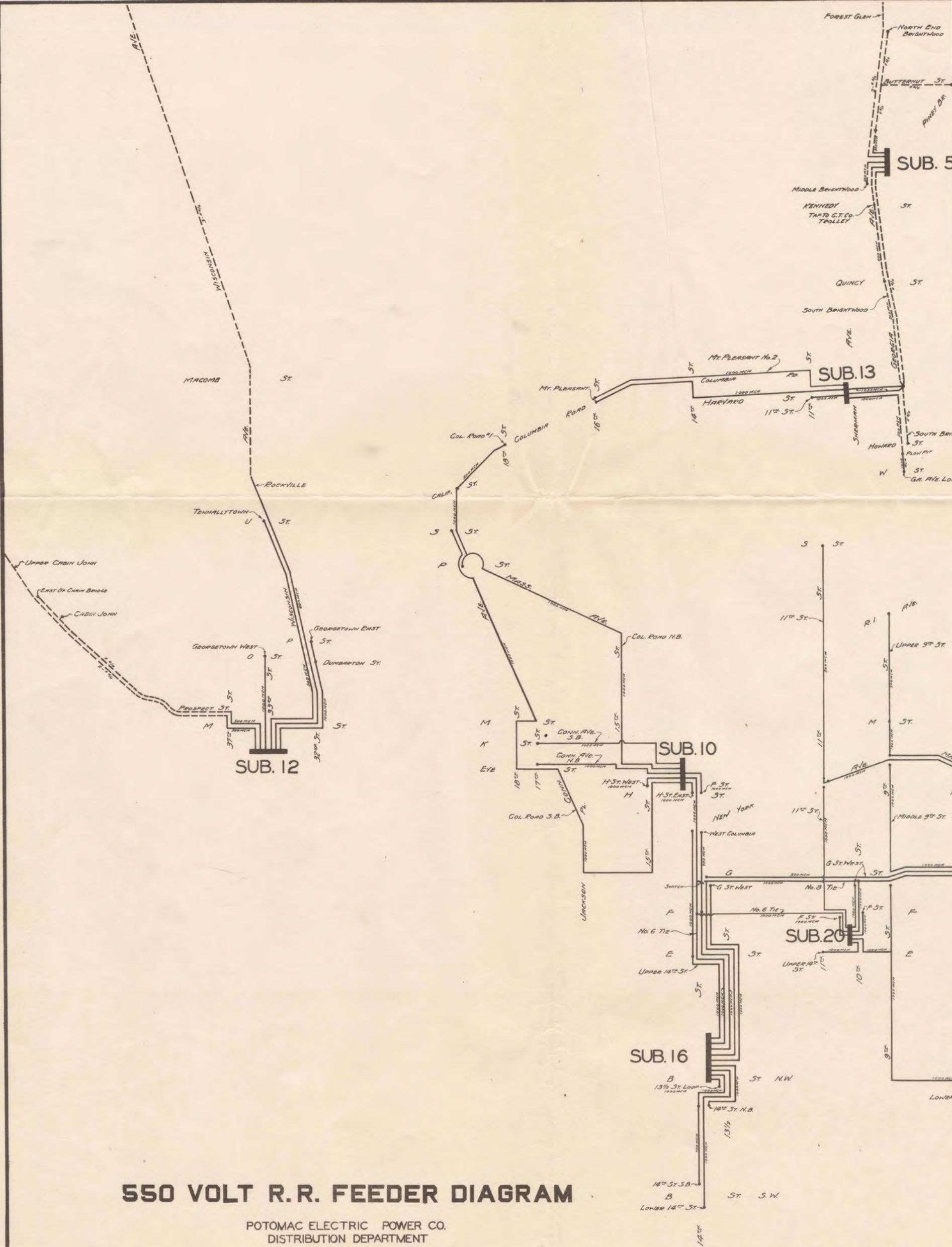


DIAGRAM OF RO 6600, I

POTOMAC RIVER

-LEGEND-

- EXISTING O.M. FEEDERS
- PROPOSED " "
- ... EXISTING U.G. " "
- .- PROPOSED " "



550 VOLT R.R. FEEDER DIAGRAM

POTOMAC ELECTRIC POWER CO.
DISTRIBUTION DEPARTMENT

DATE - JAN 24th 1925

Approved
J. B. Patterson
Supt. Distribution Dept.

POD
TIA TO C.T. CO.
TROLLEY
NORTH END
BRIGHTWOOD

BRIGHTWOOD

K. LOOP

ST

ST

ST

MD.

MD.

MD.

MD.

