ELECTRICAL DISTRIBUTION ON THE UNIVERSITY OF TENNESSEE CAMPUS

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INTRODUCTION

The many recent developments that have been made on the University of Tennessee Campus have called forth increased electrical demands at the University Power Plant. To meet these demands new electrical lines are placed or old lines are extended or tapped to provide the electrical energy. Existing maps and records soon become obsolete unless every change is recorded. Such has been the case of records concerning the electrical lines on the campus of the University of Tennessee.

PURPOSE

The purpose of this thesis is to gather any and all existing information concerning the electrical distribution lines from the power plant to the sub-stations over the campus, and to provide a suitable map, showing these lines as they appear on the campus. If this map is kept up-to-date, it will provide a valuable source of information to anyone who should be concerned with the electrical distribution and electrical loads on the campus. This map is being prepared specifically for the power plant and for use of those in charge of its operation.

SOURCES OF INFORMATION

The data and information for this thesis was obtained from three sources, from a thesis written by Mr. D.A.White, from existing maps and drawings found in the records of the University of Tennessee Power Plant, and from the personnel at the power plant. A map similar to the one found in this thesis may be found in Mr. White's thesis, "A Training Course for Power Plant Employees", which was up-to-date at the time the thesis was written in 1937. Since that time several changes have been made in the electrical system and very little data in the form of written records could be found regarding these changes. D.M. Nicholas, present superintendant of the University Power Plant, and Earl Hillen, another employee, were responsible for most of the changes made, however, and their help in the preparation of this thesis has been invaluable.

PROCEDURE

The first step taken in the preparation of this thesis was to secure a print of the map used in Mr. White's report. On this print were penciled the changes that have been made in the distribution system. Sizes of wire for different circuits were either accepted on the basis of knowledge by Mr. Nicholas and Mr. Hillen, or by an estimation from measuring with calipers the outside diameter of wire covering and comparing with that of existing wire coverings for wire of known sizes. The positions of manholes, poles, transformers and routes of lines were checked on Mr. White's map and changed where necessary. The original intention was to accurately plot these lines and equipment on a large master map of the entire campus. After a thorough search through drawings and map files in different departments of the University, however, it was revealed that no suitable map was obtainable. A very good map was found in the office of Mr. C.T. Nunley, Jr., Engineering Administrator for the University of Tennessee, but this map was in two sections, which, if combined, would form a map about six feet square. Such a map would be very good to use in accurately plotting all information required but would be too cumbersome to be placed in a thesis. The cost and length of time required to get prints, piece them together, and photostat the whole map would be prohibitive. It was decided, under the cir-

cumstances, to make another map similar to the one used by Mr. White. This was done after efforts to obtain a better map had failed. With the map drawn, the electric lines were placed in their correct locations, and wire sizes were enumerated. Poles and manholes were correctly located and all other available information plotted.

PRESENT DISTRIBUTION SYSTEM

The University of Tennessee Power Plant furnishes electricity for thirty-three buildings on or near the campus, and also sends a high voltage line to the University Farm, which is about a mile from the plant. There is a total of seven high voltage lines leaving the power house. They are:

(1) Home Economics
(2) Humes
(3) Science & Geology
(4) Estabrook
(5) Biology (Old Strong Hall underground)
(6) Strong Hall (Overhead)
(7) Farm (Overhead)

The switchboard connections for these lines is shown in Chart I, the busses being energized by either or both G. E. and Westinghouse steam generating units, both 500 Kw. units. In case of emergency, it is seen that part of the load may be taken over by the City Electric Distribution System. From the diagram it is seen that the Home Economics and Humes lines are connected to the same switch. The Estabrook and Science & Geology lines are also connected together, and the same is true for the overhead Strong Hall line and Biology line, the latter having been formerly called the Strong Hall underground line. At the present time all of the lines are underground lines except Strong

Hall line and the Farm line. The distribution on each of the lines is shown on Chart II. It is seen that there are twenty-two sub-stations, four of which consist of transformers located on poles near the buildings. Six of these sub-stations serve more than one building, the lines carrying low voltage from the sub-station to the buildings.

CHANGES IN DISTRIBUTION SYSTEM SINCE 1937

Since Mr. White wrote his thesis, the following changes have been made:

(1) Reece Hall has been removed, causing a slight change in the line leading to the Administration Building.

(2) Old Strong Hall underground cable has been partially removed from the manhole in rear of the Biology Building on to the Cafeteria and New Strong Hall on White Avenue. In this thesis the remainder of this line is called the Biology line.

(3) The line going to the Armory and West Stadium from the Strong Hall overhead line in rear of the Gymnasium has been slightly relocated.

(4) A line has been placed to the enlarged East Stadium from the Biology line in front of Estabrook Hall.

(5) A low voltage line has been placed from the Henson sub-station to Chamberlain Residence just behind Henson Hall.

(6) A sub-station has been placed in the cotton-seed laboratory at the back of Estabrook Hall. Another sub-station will be placed in the Engineering Experiment Station as soon as it is completed. These buildings will be served from the Strong Hall overhead line.

(7) Aconda Court will have been connected to the new Hospital sub-station, located in the practice house next door, in a very short while and may be considered as another building in the system.

With these changes corrected, the present system of lines is shown on the enclosed map.

SPECIAL FEATURES

There are several provisions made throughout the system to insure a continuous service. First, the switch is provided to the City Electric Distribution System. While this line is not sufficient to carry the entire campus load, it does provide a stand-by source of power which may be used to furnish electrical energy to the U.T. Farm and to electrical equipment in the power plant. In case of an emergency, it might be necessary that this power be required in starting and operating the plant equipment which is necessary for power production. This is especially true with regard to No. 5 boiler and generating equipment, the operation of which is largely electrical.

At the pole near the Rose Avenue entrance to the campus, where the Farm and Strong Hall lines separate, are sets of jacks which may be connected in such a way that all the load on both lines from this point out might be carried on either the Farm line or the Strong Hall line. Similarly, in the manhole behind Humes Hall, it is possible to shift either or both the Humes and Home Economics loads to either single line, but no jacks are provided for a rapid change. Connections would have to be made in the manhole, but this can be easily and handily done. The Gymnasium is also connected in such a manner that it may receive power from either of two lines. Normally, it is

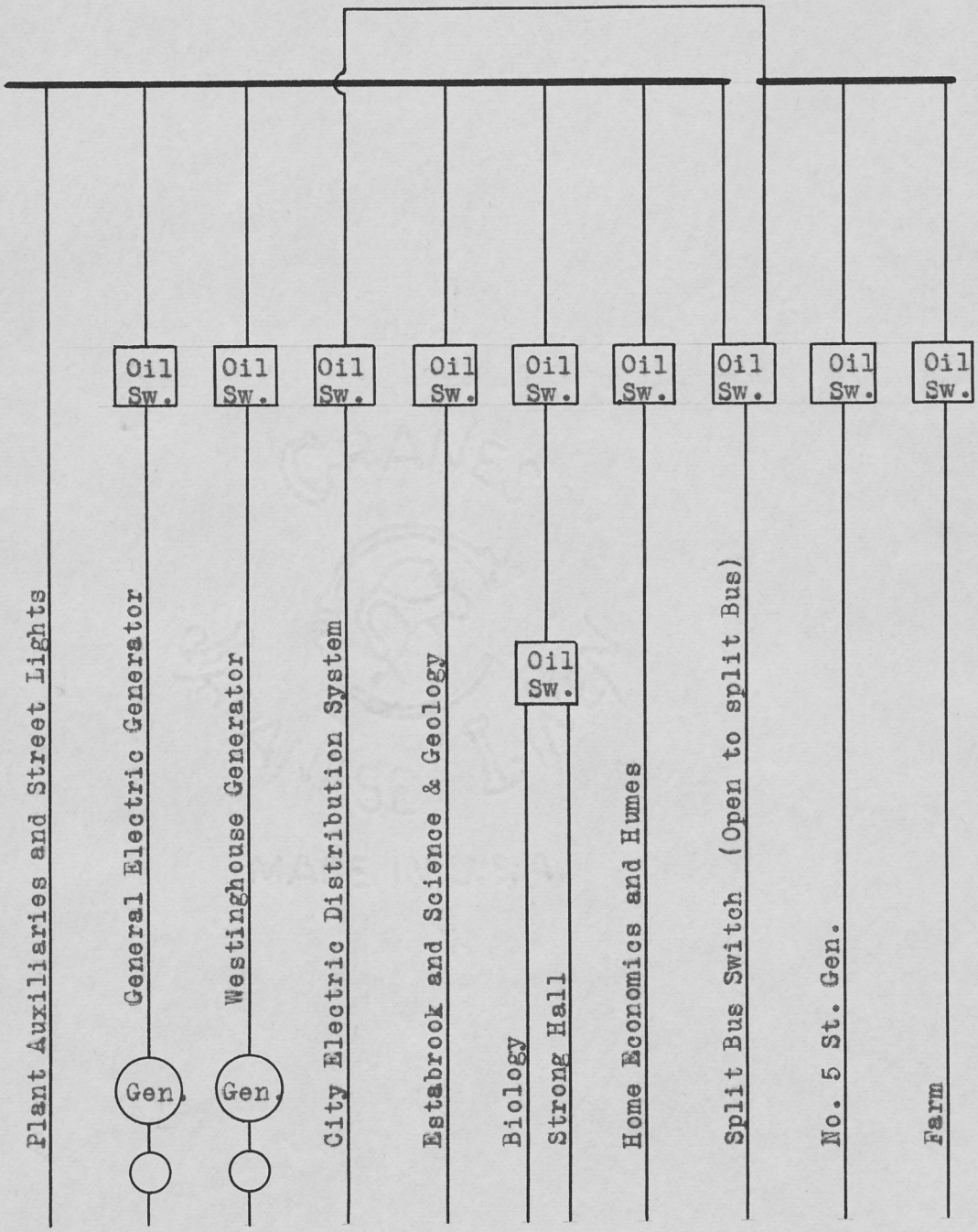
served by the Science & Geology line, but jacks are provided so that the load may be switched to the Strong Hall overhead line. These jacks are found on the pole between the Gymnasium and the Biology Building. Such installations as are described above provide assurance of practically continous service to all buildings on the campus.

CONCLUSIONS

In conclusion, the fact should be brought out that the electrical distribution system on the U.T. Campus has been installed in steps over a period of years. Additional loads sometimes require larger wires. Remote buildings sometimes require altogether new lines. In spite of the additions, changes and replacements in these lines through the years they have been in service, the lines appear to be in excellent condition and of ample size to carry any load which might be expected.

CHART I

SWITCHBOARD CONNECTIONS IN THE U. T. POWER PLANT



ELECTRICAL DISTRIBUTION ON UNIV. OF TENN. CAMPUS

DR. C.W. ANGEL

TR.

DATE 6-15-33

Overhead Line - 2300 V.

Underground Line - 2300 V.

Low Voltage Line - 230 - 115 V.

Engineering Experiment Sta.

Power Plant

Estabrook

East Stand

Football Field

West Stand

ARMORY

Ferris Hall

Carrick

Brown

Gym

Sci. & Geol.

Phys. & Geol.

Science Hall

Chemistry

So. Colleges

Y.M.C.A.

Biology

AYRES Hall

Hums

Anim. Biolg.

Turner House

Greenhouses

Main STREET

Cumberland

Avenue

White

Avenue

Rose Ave.

15th Street

Temple Court

Aconda Ct.

Infirmary

Prof. House

Faculty Club

Tyson House

Chamberlain Res.

Henson Hall

Chamberlain House

Cafeteria and New Strong

Strong Hall

Home Economics Bldg.

Nursery

Prof. House

Library

Farm Line

Street

Avenue

Temple

CHART II

DISTRIBUTION LINES ON THE U. T. CAMPUS

LINE	SUB-STATION	BUILDING
HOME ECONOMICS	HOME ECONOMICS	HOME ECONOMICS
	PRACTICE HOUSE	PRACTICE HOUSE
		NURSERY
	LIBRARY	LIBRARY
HUMES	HUMES	HUMES HALL
		AYRES HALL
		SCIENCE HALL
		CHEMISTRY
		OLD SOUTH COLLEGE
SCIENCE & GEOLOGY	BLOUNT	BLOUNT HALL
		CARRICK HALL
		PHYSICS & GEOLOGY
	GYMNASIUM	GYMNASIUM
ESTABROOK	ESTABROOK	ESTABROOK HALL
	FERRIS	FERRIS HALL
BIOLOGY	BIOLOGY	BIOLOGY
	EAST STADIUM	EAST STADIUM
	ADMINISTRATION	ADMINISTRATION
STRONG HALL (Overhead)	COTTONSEED LAB.	COTTONSEED LAB.
	ENG. EXP. STA.	ENG. EXP. STA.
	WEST STADIUM	WEST STADIUM
	TURNER HOUSE (Tr.)	ATHLETIC OFFICE
	Y.M.C.A. (Tr.)	Y.M.C.A.
	HOSPITAL	HOSPITAL
	PRACTICE HOUSE	PRACTICE HOUSE
		TEMPLE COURT
		ACONDA COURT
	HENSON	HENSON HALL
		CHAMBERLAIN RES.
	CHAMBERLAIN	CHAMBERLAIN HALL
	CAFETERIA	CAFETERIA
		OLD STRONG HALL
FARM (Overhead)	FARM	FARM BUILDINGS
	FACULTY CLUB (Tr.)	FACULTY CLUB

APPROVAL

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

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