



District Heating



Downtown Lansing, Michigan showing area served
by the Board of Water and Light's steam system —
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STEAM SERVICE IN DOWNTOWN LANSING

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Lansing, Michigan**

The underground steam piping complex in downtown Lansing doesn't rank very near the top of the list as to size but may be close to the top in regard to percentage of possible customers and annual load factor. The improvement in the latter particularly, along with recent growth of the system, is quite remarkable. This factor was only 24 per cent as recently as the year 1946, but will be approximately 48 per cent for the year 1969. It is doubtful that in 1946 anyone would have predicted this much improvement in 23 years. Four items obviously are largely responsible for this marked improvement.

1. The development and use of absorption equipment for space cooling.
2. The increasing use of steam for humidification.
3. Increased lighting intensity. This improves the annual load factor in two ways.
 - (a) It reduces the maximum heating load while increasing the continuous cooling load.
 - (b) More steam is required per unit of heat removed by the absorption process than is required per unit of heat added by the usual heating processes, and the total annual hours of space cooling is nearly equal to the total annual hours of space heating in many buildings.
4. Increased ventilation through dual-duct systems.

Dual-duct systems usually are designed and operated to maintain a constant cold duct temperature of approximately 55 F by mixing inside and outside air, and frequently are operated continuously. The steam requirement for the greater volume of outside air at moderate temperatures increases more rapidly than the requirement for the minimum volume at low outside temperatures, thereby improving the annual load factor.

Installation of what now totals 16½ miles of mains and services in Lansing began in the year 1901. Steam was first generated in the Piatt Brothers Electric Plant located one block south of the four-square-block area occupied by the State Capitol Building. This was 24 years after Birdsill Holly started this underground business at Lockport, New York. The originator's namesake and descendant now resides in East Lansing.

The small Piatt Plant, together with other equipment and franchises, was acquired by the Michigan Power Company in 1906. A larger steam and electric generating plant was completed during 1908 on the site of the present Ottawa

Street Station which replaced the earlier plant in 1938. The 1908 plant and all other property of the Michigan Power Company was transferred to the Lansing Board of Water and Light on September 1, 1919.

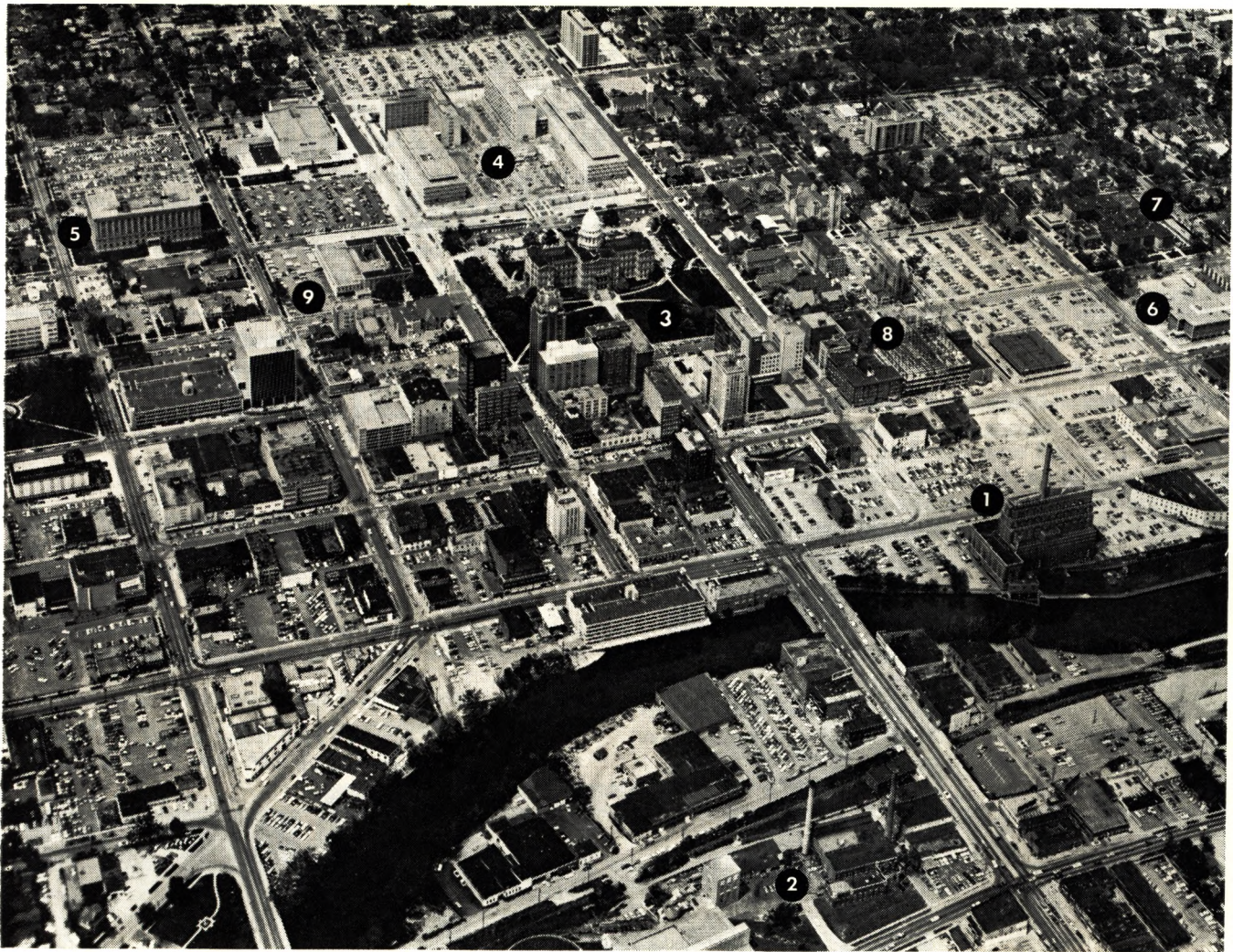
Beginning with acquisition by the Board, steam service was extended within reasonable economic limits in all directions from the centrally located Ottawa Street Station. Originally all customers were served with low-pressure steam (less than 15 psig), much of which was exhausted from turbine-generator units. The service has been very popular to date, and the quantity of steam sold has increased nearly every year, in spite of the coal stoker popularity during the 1930-40 depression decade.

During 1927, a transmission main was installed across the Grand River to connect the Cedar Street Water Pumping Station with Ottawa Street Station. In 1934 a similar larger main was completed to permit the large Moores Park Station to supply steam to the Downtown District while the present Ottawa Street Station was being constructed. The latter main passes through the southwest portion of the district and serves as a booster source for this now heavily loaded portion. It also supplies all steam required by the new State Office Buildings Complex. Addition of the fourth boiler to the heating plant at Moores Park Station during 1968 will provide capacity which will be needed soon. During 1967, a portion of this main was rerouted to the closest bridge over Highway I-496, which still is under construction.

Many of the residences and small commercial buildings which were served during the earlier years have been razed in preparation for replacement by large buildings and parking ramps.

Three major building programs are well under way in Lansing.

1. The State of Michigan recently completed construction of three new office buildings directly west of the present Capitol Building. A new, larger Capitol Building is in the final design stage, and several additional office buildings are expected to eventually occupy the 12-block area west and southwest of the present buildings.
2. Facilities sufficient to serve an eventual enrollment of 10,000 students in the Lansing Community College are planned for the north portion of the district west of the Grand River. This will involve several new large buildings in the area which is beginning to be cleared north of the two present L. C. C. Buildings.



Downtown Lansing: (1) Ottawa Street Station, along west side of the Grand River (2) Cedar Street Station (3) State Capitol Building (4) Newest State Office Buildings (5) First State Office Building (6) New L.C.C. Building (7) Old L.C.C. Building (8) Uncompleted Bell Telephone Building (9) U. S. Post Office.

3. Urban Redevelopment. This involves eventual replacement of most of the old or obsolete buildings in the downtown area. This program is developing more slowly than anticipated due to various legal and financial problems.

The above three programs have influenced the planning and development of the downtown system for many years. The original low-pressure system, supplemented by high-pressure boosters, should be adequate for the increased loads which are expected to result from the latter two programs. The low-pressure system became inadequate for the State load upon completion of the Stevens T. Mason Building in 1952. Further increases in the State load following completion of the proposed Capitol Building will require sizeable additions to the high-pressure distribution system.

Several of the types of underground pipe encasements or ducts which have been available or popular during various periods have been used in the Lansing system. All types have certain advantages and disadvantages, but appear to be satisfactory when installed within the stated limitations of the respective products. Poured-in-place concrete has always been the predominant type used. This type now is installed about as quickly and as cheaply as any type by experienced workmen using ready-mixed concrete delivered on order. The thickness of the calcium silicate insulation used depends upon the temperature of the steam to be distributed. Slip-

type expansion joints have always been used almost exclusively in the Lansing system.

A portion of the original pipe and wood service duct installed to serve the Capitol Building in 1901 was replaced recently during street resurfacing operations. No maintenance had ever been required but inspection of the duct indicated that it would not outlast the new pavement.

Three of the most stubborn problems that presumably plague most district heating companies still are encountered in Lansing. These three are involved as consistently as any involving the design of buildings and equipment for the use of steam. They are:

1. Lack of complete double glass or windows to permit the desired humidification.
2. Use of piping materials which corrode rapidly when conveying steam condensate.
3. Use of non-cleanable tube instantaneous heaters for 180 F water.

The matter of problems suggests a possible project for IDHA namely, a listing of the large office building material and equipment design and installation characteristics which currently provide the closest approach to trouble free operation, with optimum environmental conditions and minimum expense. ●