ELECTRIC LIGHTING OF A SMALL CITY OR TOWN

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The lighting service of a small city or town is often a more difficult problem than that of a larger one, partly for the reason that usually the business or "load" of the plant is very scattered; the amount to be expended on street lighting is limited, and there appears little prospect of a satisfactory day load being forthcoming. For these reasons the standing charges of the plant are apt to be higher in proportion to the connected load than in the case of the larger city.

At the outset the writer would affirm that whether the plant is to be a municipally owned, or privately controlled, one, the services of a thoroughly competent and disinterested consulting engineer should be retained, and his advice acted upon—not simply in the first layout, but also in subsequent extensions or enlargements of any moment. It rarely comes about that the powers that be, whether municipal councils or boards of directors, will, in a plant of this size, engage and retain the services of a man as manager or superintendent, thoroughly competent to deal with all problems of both a business and mechanical or electrical nature—consequently through false economy a "cheaper" man is placed in charge, and in too many cases the plant appears in a few years' time a thing of shreds and patches—costly experiments and mistakes having been carried out and no set plan or purpose followed.

The design of the plant in a growing town should be such that it can be enlarged from time to time and yet retain evidences of more forethought than afterthought—the building of such a design that its symmetry and usefulness will not be impaired or destroyed—ample room having been obtained at the outset not only for the building and its inevitable enlargement but also for storage and other purposes. The type of apparatus to be installed, also the size of the units, the voltage to be carried, these should all be considered from the standpoint of future growth as well as present efficiency. In a plant of this size with the amount of money and business available "scrapping" is apt to be a more serious consideration than in the larger city.

It will in the long run be found desirable for all parties that as steady a load as possible be placed upon the plant—with this in view the matter of furnishing power for pumping the town water supply is well worth considering. The success of motor driven centrifugal or multi-stage rotary pumps is established, so that the operation of the pumping system from electric power will usually be found advantageous. In the case of a privately owned plant the town should not only be able to contract for power at a favorable rate but should also be able to make better terms for street lighting. The furnishing of a day load is not only of advantage to the plant but is a convenience to the citizens, and if the merits of electric power for numerous industries are duly set before the public, manufacturing is encouraged and growth assured in many directions. If the pumping is a direct system the operation of the units for the ordinary domestic pressure can be operated and their consumption of current measured. For a fire pressure a centrifugal "booster" driven by a separate motor can be applied, the current for which can be separately metered. Or, a rate per million gallons pumped could form the basis of charge.

In the case of a municipally owned plant it will usually be found advantageous to combine the water and light plants in the one building, particularly if a steam plant is installed. In this case the building should be fireproof throughout, the boiler, engine and dynamo rooms separated by suitable division walls, and the dynamos and switch-boards and other electrical apparatus installed on a higher level than the water plant, so that in case of any accidental flooding no damage would be likely to be caused to the former.

Should the town favor the granting of a franchise to a company or individual, the contract for power and street lighting should be for not less than a term of five years. No one should expect as favorable a rate under a short term contract as one having reasonable duration. Street lighting apparatus is special and cannot be used for any other purpose after the contract is taken away. A clause should be inserted, however, that "in case the maximum number of lights is increased at the expiration of ..... years beyond the number now contracted for, the town should be entitled to a reduction in the price per lamp per night." In this way one of the benefits of decreased cost of operation as the load increased would accrue to the town, and in this way would stimulate the installation of additional lamps and a more liberal appropriation for street lighting.

As to the system of illumination for street lighting—the business streets should be lighted by arc lamps, also any bridges, railroad crossings and the like. For residence streets and infrequently travelled roads 32 c. p. or 50 c. p. series incandescent lamps will be found to be a satisfactory illuminant. By their use a given appropriation can be made to give reasonably good lighting over a larger area than if arcs only are used. The lamps spoken of should not be confounded with the ordinary incandescents so often seen and so seldom giving effective results. The writer has had in operation a number of the above lamps for a considerable period and has found their use most satisfactory.

The installation of the constant current transformer fed from the constant potential alternating generators will usually be found to furnish a satisfactory medium for arc lighting—the closeness of their regulation enables the plant to operate both series enclosed arcs and series incandescents on the same circuits with excellent results.

Regarding a schedule for street lighting—in a town of this size a Moonlight Schedule is usually ample. If the town is operating the plant considerable economy can be arrived at by operating in this way; shutting down for an increasing number of hours as the moon nears "full," with little or no lighting for a night or two each side of full moon and shutting down after that when moon is well up for a number of nights, will furnish very fair service (if administered with discretion). The station operators, however, should keep a lookout for heavy clouds and start up, otherwise constant complaints will come in. If the plant is a private one, the town might with profit arrange a contract on the basis, of, say, 3000 hours of lighting for the year, following a schedule similar to above. In this case an officer of the council should be empowered to order lights on at any time. The hours run could be checked by Bristol recording ampere meters in each circuit and any deductions or extras allowed at the year's end. With other suitable provisions as to outages, etc., the above should form a satisfactory form of schedule.

Whether the plant is municipally owned or not, nothing but a meter system as a basis of charge for commercial and domestic service should be thought of. The smaller plants are too apt to begin operating with a flat rate system of charges, and when the inevitable day comes when the meters have to be used a great deal of dissatisfaction is brought about which would have been avoided by adopting a more sane method at the start. Considerable study should be given to the matter of rates and discounts, as all business is not of the same value to the plant.

If the plant is to be operated by the town, the entire system should be placed in charge of a competent man—not only from an electrical standpoint but also from the business point of view. He should be given an absolutely free hand in the employment of his help and their discharge, and whether he is responsible to a board or committee or to members of a commission, he should have something to say in the awarding of all contracts. All suggestion of politics should be rigidly excluded and every encouragement given to men who show a disposition to perform a little more than their duty. Complete and reliable records and account should be kept of all details of operation and expenditure, and every item rightly chargeable debited to the lighting system. If this is done there will be less question as to actual cost of operation.

In reference to the much discussed matter of depreciation, the writer would prefer, in the case of municipal plants, to have a fixed percentage set aside each year and placed to the credit of the plant, out of which repairs and replacements could be cared for. If there is a bond issue with sinking fund set aside annually, this will usually take care of any reasonable depreciation through obsolescence. The above is, it is believed, more satisfactory than taking care of repairs and replacements as they arise—spasmodically—which is apt to throw an undue burden on the plant at intervals—possibly little at the beginning and inevitably more later on. In some municipally owned systems this percentage is added yearly to the actual cost, in others it is not shown at all, but repairs and maintenance charged up to the operating account. In others due provision is made for sinking fund payments, while in others the capital expenditure is not raised by debentures but is provided out of current revenues. The writer believes the method suggested would prove a satisfactory way of dealing with the question, but in many instances the financial arrangements of towns or cities do not allow of any credits being carried over from year to year, making it necessary for those in charge to smooth out the peaks of the financial load by endeavoring to meet these expenditures in as systematic a manner as possible.