

# MUNICIPAL DEPARTMENT

## THE PROBLEM OF PURE WATER SUPPLIES.\*

After a source of supply has been selected, and storage, if necessary, provided, it then behooves the officials to see that the water is distributed throughout the city by means of suitable pipes at suitable pressures, and in the least expensive manner. The uneven rate of water consumption throughout the day and night, and the sudden demand for large quantities in one locality in case of a conflagration, make it desirable in most cases to have a distributing reservoir near or in the city, into which the water is uniformly delivered by gravity, or by pumping, and from which it is drawn through the distributing pipes in accordance with the demand. Sometimes such reservoirs are impracticable for topographical reasons, as in Chicago, and then ample means for pumping directly into the mains, with facilities for quickly responding to the changes in the draft, must take their place.

The water-pressure must be neither too great, straining the fixtures or leading to waste or inconvenience, or too light, giving insufficient discharge. Water should be expected to flow freely in the upper stories of all ordinary buildings. In hilly cities it is often necessary to have a high and a low pressure service, each requiring a separate system of distributing reservoirs and pipes.

The pressures in the pipes should ordinarily range from 20 to 80 pounds per square inch. Where they are high, and where the loss of property due to fires cannot be very great, it is customary to utilize the pressure in the pipes, instead of fire-engines, for putting out fires. When this is to be done, the designing engineer must see that sufficient pressure exists everywhere for this purpose, so that, with the greatest hose-lengths in use, and under other usual conditions, enough water can be thrown upon the fire.

It is a common mistake, due apparently to motives of supposed economy, to make the pipes or mains too small. It is not unusual to find them only 4 inches in diameter or less, when supplying extensive territories. In case of a large fire, the draft upon such a pipe is so great that the pressure and the supply become seriously deficient. The sizes should be so proportioned that, both for fire and domestic purposes, the quantities and pressures in any part of the city will be ample.

It is a matter of importance, particularly where the water is not of the best quality, to so unite all the pipes that there can be a complete circulation, sometimes in one and sometimes in the other direction. So called "dead ends," or the abrupt

termination of a pipe, should be avoided, because a stagnation of the water is possible. Furthermore, when there is a sudden change and a large draft at one point, a circulatory system will permit the water to be drawn at a given point from both directions, thus more than doubling the quantity available.

The net-work of the distribution requires still further attention. With a main in every street, it sometimes makes a considerable difference in the total cost whether the largest pipes are laid through the middle or along the periphery of a certain district.—the most economical location being, as a rule, through the streets where the greatest draft is expected. Every locality has its own economical problems, which a competent engineer will not overlook.

The distributing mains should be capable of being cut off by valves at suitable points, so that, when repairs or new connections become necessary, only a comparatively small district need be deprived of water. A careful study may make it practicable to economically shut off no more than two or three blocks at a time.

Hydrants should be placed sufficiently often to control a fire occurring at any point. It is customary to have from ten to fifteen to every mile of pipe in residence districts, and from twelve to fifty per mile in business districts where valuable merchandise is concentrated. Yet it must be remembered that a closer grouping of hydrants will not alone suffice to deliver a greater quantity of water. The sizes of the mains must correspond to the frequency of the hydrants.

Space does not permit us to consider the ways in which authorities should control the use of water by the people, and regulate the plumbing so that waste and damage shall be prevented. Suitable ordinances should be adopted to protect the supply from misuse and prevent it from endangering property.

The method of paying for water should likewise receive careful attention. Measurement by meter should be adopted wherever practicable, as the fairest method both for the consumers and for the city, provided there is a fixed minimum rate which permits of an ample amount of water for legitimate use. Instance the city of Atlanta, where over 89 per cent. of the quantity consumed by private parties is metered, with the result that waste is materially reduced, and the *per capita* expense of pumping and purifying the water is kept very low.

When meters are not used, the charges should be governed as nearly as possible by the ratio of the quantities probably consumed. Unfortunately this is not always the case, as the usual water tariff frequently contains rules which favor some consumers and unjustly impose greater charges upon others.

Finally, an important question for city officials to consider is the ownership of the works, whether the city shall own them, or a franchise be awarded to a private corporation to supply the water to the inhabitants. Over one-half of the water-works of the United States belong

to private companies. The largest cities, however, are generally found to own the works, while in the newer sections of the country, or those which develop less rapidly, we find a higher percentage of private works. One reason for this lies in the fact that the larger cities, having better credit, are better able to raise the necessary capital; another lies in the feeling that in large cities the works can be better managed in the public interest. Therefore we find that, of the fifty largest cities of the United States, seventeen have, within the last fifty years, changed from private to public ownership, while but one city\* has sold its works to a company. Nevertheless, it often occurs that for financial reasons, or on account of a prejudice against incurring a greater debt, serious objections are urged against a town owning its works. It is not always realized that by the franchise system the taxpayers generally assume a greater burden than by public ownership. Still there are many cases where private companies are preferred, and are even necessary, to enable the inhabitants to secure the benefits of a supply. It then becomes exceedingly important that the city officials thoroughly inform themselves of the many intricacies of the subject before granting the franchise, so that they can properly guard the interests of the citizens. Before awarding a franchise, the wisdom is apparent of thoroughly investigating the claims of the promoters, the character and full extent of the proposed supply, the storage facilities, the intended distribution system with its appurtenances, and the available pressures and deliveries, with reference to domestic and fire supplies. The proposed pumping machinery and purification plants, if needed, should also be subjected to careful scrutiny, so that they will undoubtedly do the intended work; and, lastly, the estimated cost of the entire system and the proposed tariff charges, both for public and private purposes, should be conscientiously considered, so that not only a reasonable profit may accrue upon the invested capital of the company, but a protection against ill-proportioned or exorbitant rates be guaranteed to the citizens.

\* New Orleans, La., bought its works from a company in 1868 and sold them to a company in 1878. *Manual of American Water Works for the year 1891.*

**MERRIFIELD & WESTCOTT . . .**  
ENGINEERS and CONTRACTORS  
— FOR —  
**WATER WORKS AND GAS PLANTS**  
269 Front Street East, TORONTO.

**LAW BROS. & Co.**  
FOUNDERS AND MACHINISTS  
OTTAWA, ONT.



**Hydrants  
Valves  
Waterworks Supplies  
Specials**

Also CASTINGS of every description.

\* From an article by Rudolph Herring, in the *Engineering Magazine*.