Water Supply.

In the construction and management of a system of waterworks the question of pressure and distribution is of great importance. A constant figure of head or pressure is easily maintained in a distributing reservoir or standpipe where a reserve exists above the daily requirements of draught incident to the system. As daily consumption increases, the reserve force or power is reduced proportionately. Loss of head due to draught is determined by the pressure of time taken to accomplish it. The greater the length of the measures of time taken to discharge a given quantity of water, the greater the efficiency of the pressure during the length of time.

The philosophy of a system of distribution is to preserve its dynamic energy, rather than to permit its abuse. This element of power is constantly under the influences that in themselves seek to impair the efficiency and durability of all waterworks plans of distribution. The initial efficiency of a system of distribution is no evidence of its durability. There is no safety in simply being able to supply a system. The plant should in its original conception provide a reserve sufficient to compensate for the legitimate use of the dynamic energy of the plant as the daily demand and consumption of water increases. The trunk mains, leading from distribution reservoir or standpipe and under a constant head or pressure due to a constant height of water in either reservoir or standpipe, is the full measure of the efficiency of the plant. The system of distribution connected to the trunk mains, together with the service pipes leading into dwellings, factories, warehouses, stables, etc., are the influences which operate and seek to deteriorate the efficiency. These influences, according to their collective ability and opportunity, determine the velocities and accelerations of them in the water mains of the several districts of distribution. As the system of distribution is lengthened and more services are daily added to it, the reserve in the form of constant head is attacked, pressure is impaired and water ceases to flow in the higher latitudes of the system of distribution.

This is simply an illustration of the history of waterworks in Canadian cities. The remedy need not here be alluded to, which of necessity must be adopted, viz., construction of larger works in forms of new reservoirs, new pumps, new trunk mains with all the accessories. The term of durability and efficiency of a waterworks is determined by the methods of its administration regarding the details and consummation of distribution in the essential and vital features of space, time and velocity. Space refers to area of cross section of tap driven into the water main, which of course determines the velocity of discharge and the time it takes. A line of discrimination may be established with reference to size of taps which can in safety be determined according to pressure on the several variable plans of delivery. The throttling of gates controlling lines of distribution on low levels is not a safe practice in the event of fire service being needed.

The restriction in size of tap is better; it simply prolongs the time of delivery or discharge of water. The impairment of fire service is largely due to the excessive draught occasioned by a too liberal consideration of the size of taps permitted for house services. In a well matured plan of distribution, the following characteristics appear in the calculation: First, a constant pressure due to depth of water in distributing reservoir, standpipe and direct pumping system; Second, a trunk main or mains equal in cross-section of area to the aggregate cross-section of branches leading from them into the system of general distribution; Third, that the size of taps be kept down to the lowest possible cross-section of area consistent with a reasonable discharging capacity, extending over a reasonable length of time. In no respect does the small tap driven into the main diminish the quantity of water used and wasted, but the time of delivery being extended the energy of the pressure is consumed and manifested in the fact that a greater number of small taps can be served under the same pressure than a less number of large ones, the aggregate cross-section of area being the same in both instances, for the obvious reason that the differences in velocity has lengthened the time of delivery in the case of small taps compared with time of delivery in the larger ones.

A supply of water in its features of general distribution, evolves an experience similar to a domestic house supply. The outlets of discharge in the low levels of the house frequently absorb the entire pressure and no water flows into high levels until the discharge ceases at the low levels. If the pressure be sufficient to discharge water at the high levels, it is apparent that a proper consideration of the area of cross-section of branch pipes on the several levels, proportionate to the pressure at these points, will permit the water to discharge on all of the levels simultaneously.

The abuses and consequences attending systems of distribution, has led some engineers to advocate high pressure systems in place of low pressure in order to overcome the difficulties apparent in low pressure. Experience, however, proves that even under more than moderate head or pressure the trouble is just as likely to occur. The equalization of pressure in a system of distribution cannot be well attained where it is daily increasing its delivering capacity at different parts or portions of its territory, and in the nature of the topography of the city greater or less pressure may exist. Yet the fact is not to be lost sight of, that distinctive features of the figures of velocity in distributing pipes of various sizes and under varied pressures frequently found in one system, have perhaps been overlooked or have not been utilized to the extent that they might have been if careful study had been given it.

An intelligent consideration of this question simply enlarges the view of possible and probable difficulties that are liable in the administration of many systems of distribution, which in their original plan never contemplated the results that ensue from defective methods of reinforcement. It is however possible in several ways to overcome defective pressures provided it is demonstrated that there is more than enough in one district and a deficiency in another district, it can be balanced by reinforcement and without detriment to either.

In a comparatively level system of distribution a decided advantage is apparent compared with a hilly or undulating one. A wider range of variable pressures obtains in the last mentioned.

A system of gauging pressures on trunk mains and on leading lines of distribution at the highest and lowest points and in districts using large quantities of water will furnish data of pressure at all hours of the day, and from these records one may be able to work out the actual loss of head due to draught and determine if the same be excessive or otherwise. The importance of possessing the information cannot be overestimated, and it would seem as if not to have it or care anything about it, is the best possible evidence that the superintendent is a "back number" and his official associates are of no later edition.

One Good Board of Health.

Visitor—You must have a remarkably efficient board of health in this town.

Shrewd native (one of many)—You are right about that I can tell you.

'Composed of scientists I presume.'

'No, sir, scientists are too theoretical.

'Physicians, perhaps?'

'Not much. We can't allow doctors on our board of health—no, sir—nor undertakers either.'

'Hum! What sort of men have you chosen then?'

'Life insurance agents.'—New York Weekly.

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A consulting engineer in New Jersey has come to the conclusion that half the money to be spent in improving the roads would have to be used in relocating some and reducing the grades of others. The original roadbuilders seemed to prefer to go to the summits of high hills, making grades of twelve or sixteen feet to the hundred, while there were close at hand valleys that seemed to have been created for roads.