

Citadel Hill, following Cogswell Street to opposite the North Barracks, 2800 feet in length, where it is reduced to 9 inches, and leads into Barrack and Jacob Streets, 835 feet. The other runs through the common to Spring Garden Road, 3400 feet in length, where it connects with three six-inch pipes. The remainder of the distribution is made through 6 and 3 inch pipes, of which there are 13,740 feet of 6 inch, and 62,510 feet of 3 inch. The whole length of the pipeage including the mains from Chain Lakes, is 110,790 feet or 21 miles, nearly. The present distributing pipes are found barely sufficient to supply water for domestic purposes, and are totally inadequate for affording sufficient quantity for extinguishing fires. The ordinary draught through them is so great that no reliable effective head is to be obtained. If at the commencement of a fire there should be some head at a fire-plug, as soon as it has been in operation for a short time it not only loses its force but affects all others in the vicinity.

The present mains by the ordinary rules of calculation are capable of delivering at St. Andrew's Cross about two million of gallons in twenty-four hours; but the distribution being made through two 12-inch pipes, the amount passing into the city at any one time probably does not exceed the rate of one and a half million gallons per day. The mains have now a capacity equal to supplying an additional 9-inch distribution pipe.

By the present plan the sizes of the pipes are reduced too suddenly, so that sufficient water does not get down to the lower parts of the city. The most effective head is in the upper streets, Albermarle, and Grafton, where from their vicinity to the mains and a six inch distributing pipe, a head is maintained although the ground is elevated 100 feet above tide, while lower down with an increased actual head, the force of the water is almost entirely lost.

The entire works, like many others commenced about the same period, were planned on too limited a scale to be permanently available for fire purposes by the use of the hydrants and fire hose only. The quantity of water required, or at least used, for ordinary purposes, when introduced into houses, was much under-estimated. This has been found to be the case almost everywhere. In Boston, New York, and Philadelphia, when water was first introduced an effective head was obtained, but this as the consumption increased was lost, or so materially reduced as not to be available. The

same has been the result in Halifax, and the defect is becoming more sensible every day. To remedy it various plans have been suggested.

Mr. E. J. Longard proposes to bring water from the Birch Cove Lakes, which have an elevation of 239 feet above tide, or 37 feet higher than Long Lake—to a reservoir on Shaffroth's Hill; and from this reservoir he proposes to conduct the water, by three mains of 15 inches diameter to different sections of the city, and to be used for fire and city purposes only.

The greater elevation of the Birch Cove Lakes is the principal advantage claimed for this plan. Much of this advantage however would be lost in overcoming the friction in the pipes on the greater distance the water has to be brought. By the present main from Chain Lakes to St. Andrew's Cross, the distance is 24 miles, and the loss of head to overcome the friction in the fifteen inch pipe when taxed to its estimated capacity is ten feet per mile, or 25 feet in all; which deducted from 200 feet, the ordinary level of the water in the First Chain Lake—leaves 175 feet effective head. If the same average descent per mile be given to the pipe from Birch Cove Lakes so that it will deliver the same quantity of water at St. Andrew's Cross—the distance being 54 miles—the loss of head will be 55 feet, and calling the elevation of the Lakes when raised by a dam, 242 feet, will leave 187 feet as the effective head, or only 12 feet more than from the Chain Lakes. But this is not Mr. Longard's plan. He proposes to deliver the water in a reservoir on Shaffroth's Hill. In this case by laying the pipe with a descent of three feet per mile, it will discharge about one half the quantity it would at ten feet, which however would still be sufficient to maintain a head, in a large reservoir, for fire purposes. The loss of head on the four miles from the Lakes to the reservoir would be 12 feet; and from the reservoir to St. Andrew's Cross, assuming that the discharge should be equal to supplying ten jets, each throwing one hundred gallons per minute, the loss would be 18 feet when the reservoir is full; but it would be proper to allow of its being drawn down 8 feet—making 38 feet loss in all, which would leave 204 feet at the effective head at St. Andrew's Cross—being 29 feet higher than by the present pipes from the Chain Lakes. Should the size of the main however from Chain Lakes be increased to 24 inches, as is proposed, there would be a gain of 8 or 9 feet of effective head on that line—making the ultimate