

The section of the additional main between the engine house and Brethour's is worked under different conditions from that between the city and the reservoir. The pumps working at a uniform rate send forward a regular supply every hour, which cannot be increased, although by a reduction of speed it may be diminished. If this supply from the pumps is greater than the momentary requirements of the city the surplus goes into the reservoir, but if, as is now the case in certain hours of a summer day, it is less, the reservoir supplies the deficiency. The reservoir, therefore, in these hours of greatest drafts, performs the office of a third engine stationed at Brethour's, and it is evident that to meet the varying conditions of the city's consumption, and especially to check the rapidly increasing loss of pressure, greater capacity in the main is required on the city side of Brethour's than beyond that point. The figures already given show that while the consumption for the first nine months of 1879 was an average of 1,544,000 gallons per day, it was for three summer months of the same year 1,820,000 gallons per day, and for the whole month of August it averaged nearly 2,000,000 per day. In a 12-hour test in day time on 1st September last, the consumption was found to average 120,000 gallons per hour, or at the rate of 2,880,000 gallons per day of 24 hours, and for two hours of that day, during which the water was entirely off the Dundurn ridge, the consumption must have reached at least 165,000 gallons per hour, or at the rate of 3,960,000 gallons per day if continuous. On the 29th August last, when the water carts were not at work, the heaviest draft was 144,000 gallons per hour.

From the foregoing we are forced to the conclusion that the hourly draft during the busy portions of many days of the past summer must have averaged 155,000 gallons. The consumption as shown by the annexed table has doubled since 1870, and we do not think it improbable that it will double again in the next ten years; and therefore a maximum hourly rate for summer months, equals to 310,000 gallons, should be provided for.

In order to deliver this quantity so as to maintain a fire pressure of only 82 feet on the Gore and a domestic one of only 35 feet on the Dundurn ridge, the size of the new main between Brethour's and the city must be 24-inches, and with both these mains there must be a working head of 33 feet; in other words, notwithstanding the large size of the second main a loss of head or pressure to that extent must be submitted to in the city. The difference in cost between an 18-inch and a 24-inch would be about \$2 per foot, or \$29,600 for this distance. If the additional main were made large enough to afford the required supply with a loss of head of only 15 feet the extra cost will be greater than that of a central city reservoir, which later would both extinguish the loss of head present and future, and secure what the Barton reservoir and new mains, no matter how large can never do, a fire pressure over the Dundurn ridge.

The loss of head due to friction in the pipes between Brethour's and the city cannot be entirely overcome by an enlargement of