number of hours per day during which it shall be added. Throughout most of the year, from four to six hours per day is sufficient, but at a time of flood, resulting in a very material increase in color, this period may be lengthened to twelve hours, or 50 per cent. of the time.

Generally speaking, the standard set for filtered water is that of no coagulation if the color does not exceed 25. Before the filtered water reaches this figure, coagulant is resorted to, and during such application the color is to be kept at 20 or below. By referring to the accompanying diagram it will be seen that, since the adoption of this method, it has been possible to make the line of color in the filtered water substantially straight or uniform throughout the year. Under the old method of constant coagulant use, it was found impossible, especially at times of low alkalinity or sudden changes, to add sufficient sulphate of alumina to reduce the water to a satisfactory color at all times. The addition of soda ash or lime was necessary for restoring alkalinity at such times. This is entirely unnecessary with the intermittent application, as but a small portion of the alkalinity is used in the formation of the floc. The first coagulation in the conduit and basin results in a water of substantially zero color, with at least a theoretically slightly acidic reaction. This treated portion of the water, which has entered the basin chemically active, with the precipitate or floc forming rapidly, is then followed by untreated water in a quantity, because of the longer period of time, in excess of the treated water.

The thorough mixing of this raw water with the treated water is brought about at the outlet of the submerged conduit as it displaces the basin water at this point. The second reaction begins at once and is carried to completion with a restoration of alkalinity to the entire supply, this action probably being consummated during the period which elapses before the next application of coagulated water. The floc of the treated water has not had an opportunity to settle when the raw water is admitted, and readily furnishes a base about which the additional precipitation resulting from this secondary reaction forms, and serves to carry down color, sediment, and bacteria mechanically, as well as through the chemical reaction which is taking place in every part of the untreated water as it mixes with the overdosed water.

The resultant reduction of color is, therefore, due to the effect of dilution of the higher colored water with water of no color; to the second reaction, which is, in reality, the completion of a reaction started under favorable conditions of overdosing, and which reaction chemically is always complete, as the excess of the applied coagulant is taken up by the alkalinity of the untreated water, resulting in the completion of the mass reaction; and also to the mixing of the floc of the fully treated portion with the mass of the entire day's water supply, before it has the opportunity to settle. The precipitate thus formed in a large part settles before it is carried to the filters.

The sedimentation basin was drawn off and cleaned after five years' operation of the filtration plant, and it was found that large masses of precipitated organic matter and aluminum hydrate had settled in the upper portions of the basin. This deposit covered the entire basin, varying from 3 to 4 ft. in depth near the inlet to a few inches in proportion to the distance from the point of entry to the basin of the raw water.

The average length of filter runs during the four years described in this paper of the use of this process were as follows:—

Table I.

Year.	Filter runs after scraping. Number.	Average in millions of gallons per ½-acre bed.	Maximum runs in millions of gallons.	Filter runs after raking. Number.	Average in millions of gallons per ½-acre bed.	Maximum runs in millions of gallons.
1912	22	76	90	26	76	84
1913	22	95	115	23	79	91
1914	26	85	152	24	77	157
1915	29	89	229	21	42	104

In conclusion, it may be said that the use of intermittent coagulation results in a saving in expense, uniform results of satisfactory quality, coagulation without exhausting alkalinities in soft waters, and coagulation without excessive overloading of the precipitated hydrate on the filter beds.

TOWN PLANNING AS A MONEY SAVER.*

THE wrong impression has been given to many people that the preparation of a plan for a city or a town is waste of money and effort because of the probable cost of executing the plan. It never seems to occur to such people that a plan may be prepared for the purpose of reducing municipal expenditure. The object of a plan is to ascertain in advance what are the best things on which to spend the money that is available, not to find out new things on which to spend more money than is spent without a plan. In Canada at present all town planning should be directed to secure greater economy in municipal administration.

Comparison is sometimes made between the planning of a factory and the planning of a city—It being argued that as the one is necessary so is the other. But the city is such a complex thing and so many of its parts and functions are inter-related and linked up with one another that there is much stronger reason for planning the city than planning a factory or a house. Yet, every sane person who builds a factory or a house has a plan prepared for it, while most cities are allowed to grow without plan. There is one comparison between the planning of the factory and the city that is worth noting. The first thing a man does who proposes to build a factory is to decide what amount he has to spend and what facilities and space he requires. He next computes how best to fit in his requirements with his finances. If he is a wise man he calculates on the requirements of the future as well as of the present, and sees that he has a site large enough for reasonable extension in the succeeding 20 or 25 years. He then engages architectural and engineering advice to prepare plans. The architect or engineer is told what money is available, and what provision has to be made. The latter then applies his skill to prepare a set of plans showing how the provision can be made for both immediate and future requirements; next he submits estimates of costs and, where necessary, advice regarding any increased area of site required for future expansion. If the sum immediately available for building is $100,000 the preliminary plan and scheme might cost from a few hundred to one or two thousand dollars—but it might have the effect of showing the manufacturer that he should only spend $80,000 instead of $100,000. The object of the plan being to enable the building to be properly constructed according to the best design, it may as likely show that the manufacturer can accomplish what

*Conservation of Life.