Annual Consumption of Portland Cement.—The consumption of Portland cement during each of the past five years was as shown in Table II.

TABLE II.

Year.	—Canadian— Barrels.	%	—Imported— Barrels.	%	Total. Barrels.
1909	4,067,709	97	142,194	3	4,209,903
1910	4,753,975	93	349,310	7	5,103,285
1911	5,692,915	90	661,916	10	6,354,831
1912	7,132,732	83.3	1,434,413	16.7	8,567,145
1913	8,658,922	97.1	254,092	2.9	8,913,014

SEWAGE TREATMENT WORKS IN SASKATCHEWAN.

THE following suggestions with reference to the design of sewage treatment works are formulated upon principles of sewage treatment which are in accordance with present day practice, and are about to be issued by the Bureau of Public Health of the Province of Saskatchewan to serve as a guide to those preparing schemes for municipalities in the province.

Screening.—(*a*) That where sewage is to be pumped, provision be made for screening, cleaning the screens at regular intervals, and for removing and disposing of screenings.

(*b*) That where works are of a character producing a large quantity of screenings, mechanical means must be provided for their removal.

Grit Chambers.—(*a*) The function of grit chambers (or detritus tanks) being to arrest the heavier mineral particles carried in suspension, the construction of such tanks is, generally speaking, unnecessary in this province, where the majority of sewerage systems are designed on the "separate" principle.

(*b*) That in special cases where sand or other mineral particles cannot be kept out of the sewerage system, it is advisable to introduce grit chambers.

(*c*) That these be constructed in multiple compartments to take care of the varying volume of flow.

(*d*) That a lineal velocity of one foot per second be aimed at, calculated to retain the heavy mineral, but not the organic matters.

Pumping.—(*a*) That where it is necessary to raise the sewage at the works, it is advisable that all machinery be in duplicate with alternative forms of power in case of failure.

(*b*) That appliances for raising sewage be specified with reference to efficiency in dealing with solids.

Sedimentation.—(*a*) That there be at least two sedimentation tanks.

(*b*) That such tanks be so constructed that the precipitated solids are automatically and continuously removed from that portion of the tank in which precipitation takes place, and that a tank or chamber combined with, or separate from, the sedimentation tank, be provided, into which the precipitated solids may pass by gravitation immediately following settlement.

(*c*) That consequent upon the modern requirement of the continuous removal of sludge as above stated, all base slopes of sedimentation tanks be made as near to the perpendicular as is practicable, relative to general construction.

(*d*) That the tank capacity be equal to one-fifth of the dry weather flow in twenty-four hours, or equal to three hours' flow calculated upon the twenty-four hours' dry weather flow taking place in fifteen hours.

(*e*) That the cross sectional area of the tanks provide a velocity of flow of not more than .05 foot per second, while lower velocities are preferable. Flows may be either vertical or horizontal.

(*f*) That consideration be given to the design of the inlets and outlets with a view to ensuring uniformity of flow throughout the breadth of the tank, and the absence of stagnant sections; and that all channels and parts of the tanks apart from the sludge storage area, be so constructed that no solids are retained.

Sludge Storage.—(*a*) That the overall depth of the sludge storage chamber from the surface of sewage in sedimentation tank be generally not less than fifteen feet. Greater depths may be adopted, producing a more concentrated form of sludge.

(*b*) That in deep tanks, wherever possible, provision be made for breaking up the sludge at the inlet to the sludge removal pipe.

(*c*) That the capacity of the sludge storage chamber be equal to at least four months' precipitation of sludge, containing 85 per cent. of water. Greater storage capacity is preferable as septic action is delayed in winter months. The cubic capacity of the sludge storage chamber shall be taken as only that space which is below the level of the deepest point of the sedimentation tank. In general, the average accumulation of sludge may be taken as three and a half cubic yards per million gallons of sewage on the above basis of dilution.

(*d*) That ample provision be made for the escape of gases from the surface of the sludge storage chamber.

(*e*) That pipes for the conveyance of sludge be of an internal diameter of not less than eight inches and that the inclination of such pipes, where the sludge is discharged by gravity, be at least 3 per cent. and preferably 5 per cent.

Biological Filtration.—(*a*) Where a dosing or siphon chamber is constructed to regulate the flow of the sewage over the surface of filter beds, that the capacity of such chamber does not exceed a ratio of two gallons of sewage to each square yard of filter surface. For instance, if the area of the filtering surface be two hundred square yards, the capacity of the dosing chamber should not exceed four hundred gallons, representing a dose of one-half inch depth of sewage over the whole surface of the filter.

(*b*) That the depth of the filter media be not less than four feet and preferably seven feet.

(*c*) That the filter media for effluents from the above form of tank be composed of hard broken stone or other suitable material, broken from one-inch to two-inch cubes.

(*d*) That the surface area of filtering media for domestic sewage be in proportion to the population using the sewers, i.e., in proportion to the amount of oxidizable matter present in the sewage.

Where a high degree of oxidation is required, the ratio of population to surface area of filter media should be approximately 17,500 persons to the acre (or 275 square yards per 1,000 population).

This corresponds to a rate of filtration of 1,750,000 Imperial gallons per acre per day, or 155 Imperial gallons per cubic yard per day (assuming depth of filter media to be seven feet) at a per capita flow of 100 Imperial gallons per day.

The efficiency of filters will not be materially affected by increasing the rate of filtration during periods of storm