

The sludge-drying beds are constructed in narrow terraces, partly in excavation and partly in rock fill. The drainage material is sand and gravel 15 inches thick. The beds are divided into stepped compartments by concrete partitions, and are provided with drains at the back of each retaining wall to carry off the effluent and to prevent seepage to the bed below.

The dried sludge will be removed from the beds in handbarrows and raised to the foot of the cliff in dump cars by a narrow-gauge inclined railway, which is double-tracked to allow the use of a counterbalancing car.

The North End fine screen plant, as designed, includes, in addition to the quieting well, grit chamber, and disinfection plant provisions, a screen house and disinfection channels. The common features are similar to those for the tank plant. The relative positions of the different parts are shown in Fig. 3.

The screen house is merely a covered extension of the sewage channel so formed as to receive two disk screens of the R-W type, with appropriate sluice gates, by-passes, and driving machinery. The screenings, as they are swept from the rotating screen plates, will fall through chutes into exterior storage pits, from which they can be removed to hopper cars and carried over a spur track to the elevator.

As shown in Fig. 3, the disinfection process is placed subsequent to the screens, the screen effluent with its charge of chemical flowing to a series of channels arranged in steps upon the hillside. These channels are such length as to secure a detention of 15 minutes at the time of maximum flow, and of such cross-section as to maintain for average flows a velocity of about 0.7 foot per second without regulation of outlet gates.

The disinfectant will be added in the proportion of seven parts of available chlorine per million of sewage, equivalent normally to 175 pounds of bleach per million gallons.

The construction and maintenance costs of the different features of treatment were prepared in accordance with contract prices prevailing in Niagara Falls, and were as follows:—

Construction cost of interceptor	\$34,600
Construction cost of Imhoff tanks, Bender Street plant	14,853
Construction cost of Imhoff tanks, North End plant	34,184

Cost of fine screens, North End plant	46,950
Annual operation cost Imhoff tanks, Bender Street and North End plants	8,960
Annual operation cost, North End fine screen plant and Bender Street Imhoff tank plant	11,105
*Total annual charges, Imhoff tanks	14,068
*Total annual charges, fine screens	19,297

(In this connection, acknowledgment should be made of the assistance of Lieut. F. J. Anderson, B.A.Sc., formerly city engineer of Niagara Falls, Ont., who supplied the data upon which these studies were based.)

Treatment plants, including Imhoff tanks and disinfection, are thus shown more economic for Niagara Falls, Ontario, than those embodying fine screens. The differences are striking because the conditions are unfavorable to the installation of mechanical screens. The factors prejudicial to a fair showing of this type of treatment are:

1. Sewage flows such as to require one fair-sized

screen and for dry-weather discharge only one, but which, to sustain the maximum capacity of the interceptor and to provide reserve for the dry-weather unit, necessitates an additional screen, which serves to double this part of the plant cost.

2. The omission of any charges for the purchase of land, in which screens offer an economy.

3. The need for tanks or channels in which the full storm flow can be disinfected.

4. The need for additional bleach in the disinfection of screened sewage, as compared with the requirements in the case of Imhoff tanks.

The costs given strengthen the statement that fine-screen plants do not contain elements of interest to small towns, when it is desired to sterilize the effluent and when long outfalls for the

latter purpose are not available. It should further be noted that the costs, as computed, do not make screens comparable with tanks, even in performance, for not only will the screens be overburdened during storm flows, but also at times of dry-weather flow the labor costs include

*Figuring interest at 4½%, eighty-year life for interceptors, fifty-year life for structures and fine screen machinery, and 10% combined amortization and repairs allowance for Imhoff tanks machinery.

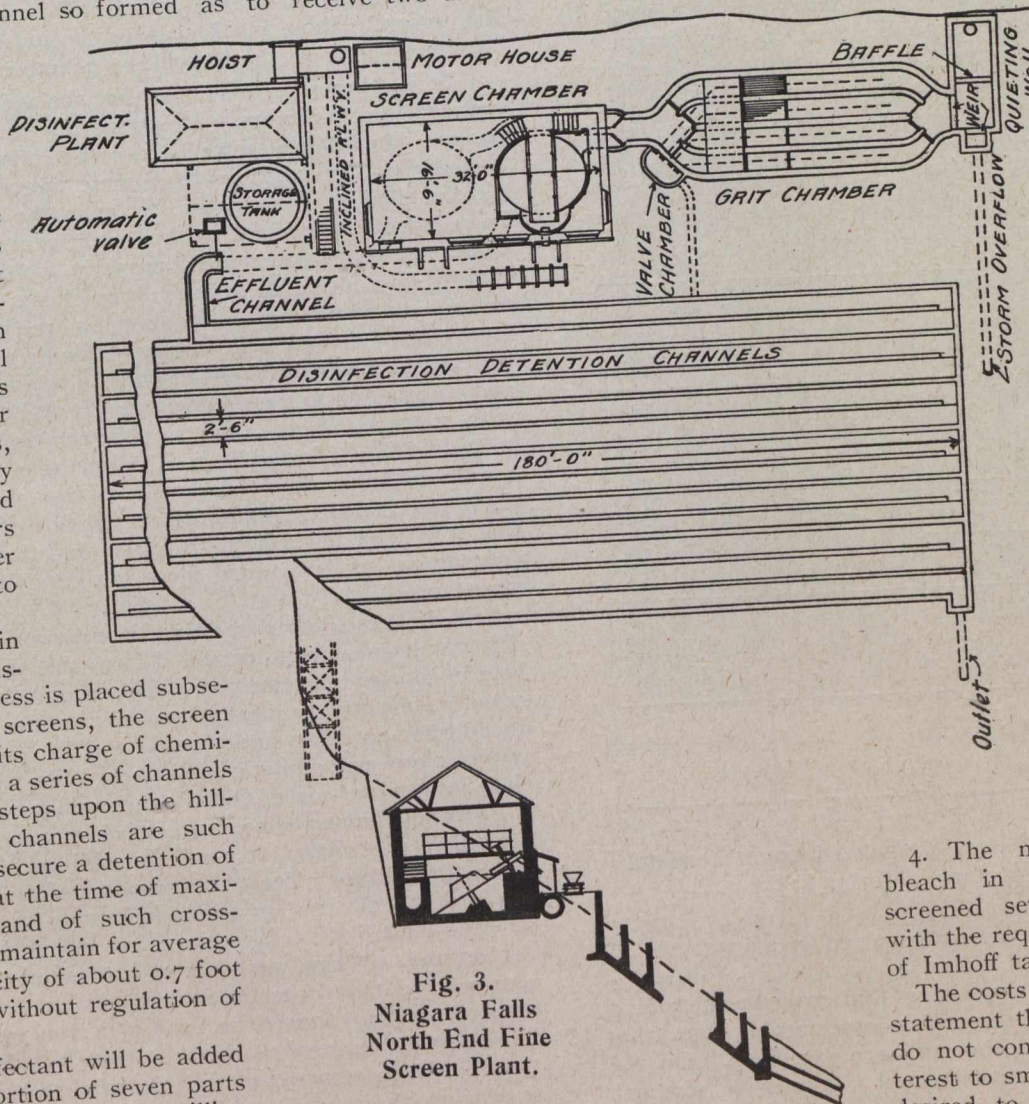


Fig. 3.
Niagara Falls
North End Fine
Screen Plant.