

ultimately of interceptors, two-story settling tanks, disinfection plants, detention basins and multiple deep dispersion outlets. Designs should be worked out for this ultimate development, and all new sewerage construction made to conform to these designs; and all of the proposed works, excepting the settling tanks, should be built as soon as the financial condition of the community will permit. The construction of the sedimentation works, however, should be deferred until the general policy for the control of the river as a whole has been formulated, at which time much more information will no doubt be available regarding the process of activated sludge and regarding the comparative advantages and economy of this process, fine screening and two-story tank treatment."

The report referred to was accepted by the commission, and the first portion of the intercepting sewer was authorized to be built by an overwhelming vote of the people, and the contract for half of the work was recently let.

Factors Governing Design

In the design of these works the practice of interceptor design was carefully studied, and our conclusions may be of interest.

The east sewage interceptor, for which contract has been let, serves the municipalities of Ford City, Walkerville and Windsor to Parent Avenue in Windsor. The sewage flows by gravity through Ford City and Walkerville to a pumping station, whence it is lifted to a higher level interceptor, through which it flows by gravity to Parent Avenue.

As Ford City had no existing sewerage system it was concluded that it would be sewered on the separate system. Walkerville and Windsor were well provided with a sewerage layout on the combined plan.

The east interceptor was, therefore, planned to meet these conditions. A storm water allowance for Walkerville and Windsor takes care of the first street washing, thus reducing pollution of the river front waters.

Regulating chambers were provided at points where the outlet sewers of Walkerville cross the east interceptor. These chambers divert the dry-weather flow, plus the storm water allowance, into the interceptor.

Measuring chambers, to determine the actual sewage flow from the several municipalities, are provided for at the dividing lines between Ford City and Walkerville and Walkerville and Windsor. The intercepting sewers were designed to serve the estimated (1950) population of the several municipalities.

The factors taken into consideration to obtain the maximum flow for the several municipalities were the following:—

1. Water consumption (domestic use, industrial use, public use).
2. Ground water leakage.
3. Storm water allowance.
4. Economic considerations.

Factor No. 3 was only considered for Walkerville and Windsor, which have a combined system of sewers. To provide for contingencies which may arise and increase the sewage flow, and to avoid future expensive additional construction, it was considered desirable to allow a liberal margin of safety over the present flow per capita. This is based upon the fact that capacity increases at a rate greater than the square of the diameter, whereas cost increases at a much less rate. It was considered that the ratio of maximum to average flow would vary for various structures. A ratio of about 2.5 was

used for small sewers, and this was decreased gradually to about 1.75 for interceptors.

It was concluded that 90 per cent. of the domestic water consumption, 85 per cent. of the industrial use and 50 per cent. of the public use would be returned as sewage flow.

The leakage or ground water infiltration through joints was taken as 15,000 Imperial gallons per day per mile of pipe in clay soil and 25,000 Imperial gallons in sandy soil, which on a basis of 1.25 miles of sewer per 1,000 population, gave 31 Imperial gallons per capita per day for sandy soil and 19 Imperial gallons per capita per day for clay soil.

The storm water allowance, to apply only to Walkerville and Windsor, was taken as 80 Imperial gallons per capita per day, equivalent to .005 inches of rainfall runoff per hour.

The ratio of depth of flow to diameter of sewer was taken as not over .50 for all sizes up to 24 in. and not over .80 for sizes 24 in. and over. The minimum velocity for maximum flow was taken as 2.00 feet per second in the Ford City section and 2.50 feet per second in the Walkerville and Windsor sections.

The following table gives estimated future population and assumed quantities for the several Essex border municipalities served by the east interceptor:—

Estimated Population and Assumed Quantities

Municipality.	Estimated population (1950).	Maximum rate assumed in design of interceptor,
		Imperial gallons per capita day.
Ford	15,000	250
Walkerville	11,000	350
Windsor (eastern portion)	14,000	350

The maximum rate of 350 imperial gallons per capita per day for Walkerville and Windsor include the storm water allowance of 80 imperial gallons per capita per day.

Regulating Chambers

The function of a regulating chamber is to divert the dry-weather flow and the first wash of the rain from the combined sewers to the intercepting sewers.

A considerable amount of study was devoted to determine the best suitable type of regulator to be adopted.

The general experience with mechanically-operated regulators seems to be that they are satisfactory except for their constant need of inspection and formation of deposits around the float chamber.

Many studies were prepared with different types of mechanical apparatus, and finally the choice of regulator was made from three designs that had met successfully all important objections to other types.

The regulator consists of a float in a float chamber directly connected to the intercepted sewer. Two perpendicular and one horizontal bars form the connection between the float and a float-operated gate in a gate chamber at the end of an opening designed to take the dry-weather flow, plus the storm water allowance.

The float, being directly connected with the intercepted sewer, is actuated by the elevation of sewage in the sewer, and thus opens and closes the gate to discharge the desired quantity through the gate area. The ranges in the rise of float and gate were calculated, and the point of support, which is adjustable, for the horizontal bar was determined to accommodate these changes.