

designed to withstand an internal pressure of 14 pounds per square inch, and will have a special collar to protect the joints.

The Low Level Interceptor.

Located near the waterfront, we have a second trunk sewer which is practically a duplication, on a smaller scale, of the one just described. This is called the low level interceptor. Running as it does from the corner of Front and Bathurst streets by way of Front street and Eastern avenue, to the pumping station, it covers a distance of 5 miles. The cross-section of the low level interceptor varies from a 2-ft. x 4 ft. 3 in. brick, egg-shaped, to a 5 ft. 6 in. circular reinforced concrete pipe. As in the case of the high level, to avoid the numerous underground obstructions and any further congestion of traffic on the streets, that portion of the sewer lying between Bathurst and Parliament streets, a distance of $2\frac{1}{2}$ miles, was specified to be built in tunnel, and the remaining $2\frac{1}{2}$ miles, of concrete pipe, laid in open cut. The material encountered in this work, like that on the high level, was a stiff blue clay, of a very uniform character. Driving a heading without sheeting was the practice, and open cut work could be bottomed up accurately to template.

As in the high level we also have a syphon in the line of the low level interceptor. On account of the low elevation of the latter, however, it could be constructed to the bank of the river on both sides, thus requiring a syphon only 150 feet in length over all. The design is therefore a simplification of the one described above, requiring only two concrete drop manholes on either side of the river, connected by two lines of cast iron pipe, supported on pile bents. The lines of pipes in this case were both the same diameter, namely, 42 inches.

The Pumping Station.

On reaching the eastern ends of the two interceptors, we find them both passing through the pumping station, which is situated just west of the settling tanks. Here are located the screens for both sewers, the pumps for raising the sewage in the low level interceptor, the sludge well and the high and low level venturi meters. The channels of both interceptors are widened as they enter the building to accommodate the screens, of which the high level requires four, and the low level two. Across the full width of the channel and immediately in front of the screens runs a trough 10 ft. wide and 6 ft. deep, which is designed to catch grit and heavy foreign matter carried along in the sewage. This sump will be emptied by chain-operated bucket elevators, discharging into a worn conveyer which, in turn, will deposit the material into a hopper from which it will be carted and wasted. The screens will be made up of $\frac{1}{2}$ -inch tapered steel bars, spaced $\frac{1}{2}$ inch apart. The frame will measure 6 ft. 8 $\frac{1}{2}$ in. wide by 9 ft. 6 in. long over all, and will be set at an angle of 60 degrees to the horizontal, slanting in the direction of flow. Each screen will be cleaned by a rake operated by chains. These rakes will engage with revolving combs which will remove whatever material has been collected and allow it to drop into the worm conveyer just mentioned. All the moving parts in connection with the rakes and elevators will be operated by two 10 h.p. motors.

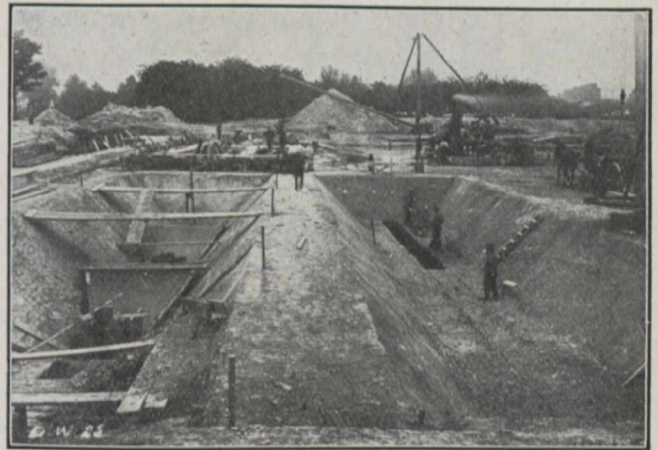
After passing through the screens the low level sewage will run into the suction well from which it will be raised by centrifugal pumps, through a height of 23 feet to the elevation of the sewage in the high level interceptor. The pumps will be operated by electric motors set vertically above them on the main floor of the pumping station. At present three are being installed, two with a capacity of 4,500 gals. per minute, and one with a capacity of 13,500 gals. per minute, requiring for operation respectively 75 and 200 horse-power motors.

Provision has been made for the addition of a fourth pump, should it be necessary, and also for the installation of a gas engine plant to supply power should the electric current fail. The motors will be fitted with automatic control, arranged so that one pump will be continually in use, while during the maximum daily flow a second will be thrown into operation, the third being reserved to assist in handling the flow during a storm.

The sewage of both interceptors is now measured by passing through venturi meters, the high level requiring 4-56 inch diameter and the low level 2-40 inch diameter. The meters are composed of throat and entry castings of iron, set in reinforced concrete tubes. The measuring mechanism is located on the main floor of the pumping station, and is provided with an indicating recorder from which the flow at any moment, and the total flow for the day, can be ascertained.

The Sedimentation Tanks.

After the flow in the two interceptors has been measured separately by the meters their channels unite and the combined flow passes into the sedimentation tanks. They are built of reinforced concrete throughout, and measure 209 x 368 feet over all. There are 24 separate tank units, each measuring in plan 25 x 100 feet, and the whole is roofed with a 5-inch reinforced concrete slab carried on concrete beams. The walls of the tanks are vertical for a distance of 10 feet from the top, at which point they converge to the centre on



Sedimentation Tanks, Showing Excavation and Bottoms.

a slope of 45 degrees, meeting at a further depth of 12 $\frac{1}{2}$ feet, the bottom of the tank is in the form of 4 valleys and 3 ridges, the latter being 4 feet high. From the former run 10-inch cast iron sludge drains, connecting with the sludge well, the flow in which is controlled by valves operated from the roof of the tank. Sewage is admitted to each tank along one side through 4-18 inch cast iron pipes, which are controlled by penstocks, and discharge downwards through a 90 degree bend over each of the valleys. Thirteen outlets are provided on the opposite side of the tank in the shape of adjustable weirs 10 inches wide, in front of which are baffle plates to prevent scum or floating matter escaping into the lake. The control of the inflow penstocks and the manipulation of the weirs are both conducted from the roof.

Sewage enters through the main inlet channel, which runs along the entire north side of the tanks, and is directed into the lateral inlet channels, which are located between each alternate row of tanks. The height at which the sewage will stand in each tank will seal the ends of the 18-inch inlet pipes, which in conjunction with the decreased rate of flow now attained by the sewage, will result in a slow, quiet passage across the tank. It is during this retention of the sewage in the tank that the solid matter, or sludge, is separ-