Discharge Due to One and One-half Inches Rainfall.—The diagram shown in Fig. 3 was prepared showing the discharge in cubic feet per second at all points along the line of the proposed storm relief sewer, due to a rainfall of 1½ inches per hour with absorption varying between 30 per cent. and 50 per cent.

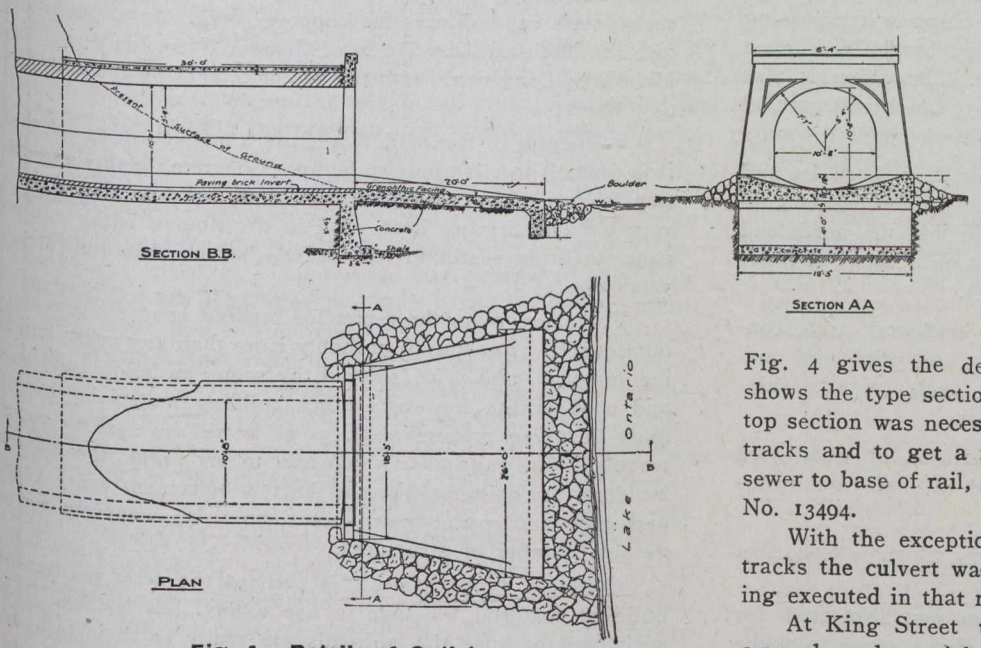

Fig. 4.—Details of Outlet.

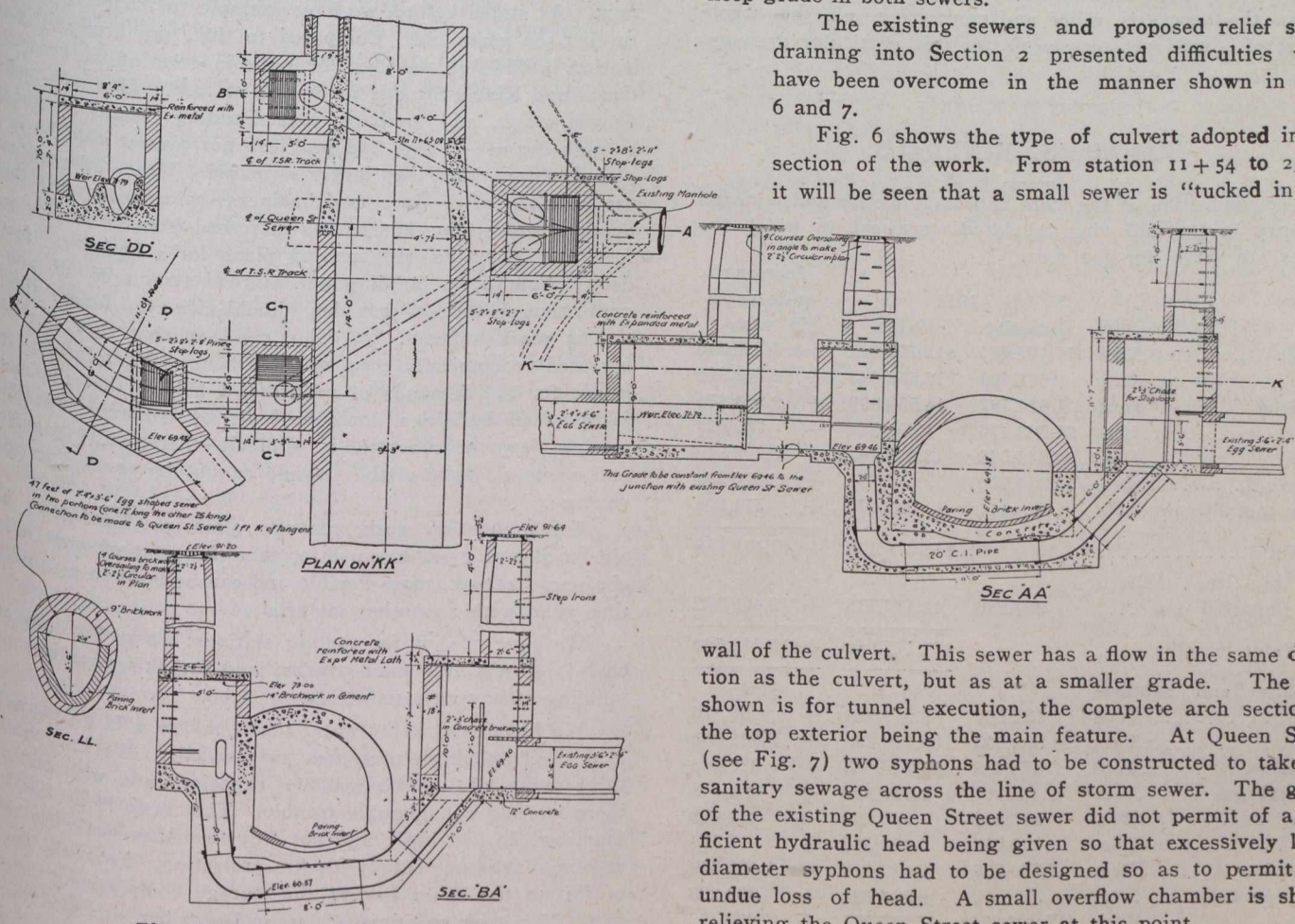

Fig. 7.—Syphons at Queen Street.

Design of the Relief Sewer.—At the point selected for relief of the existing Garrison Creek sewer it was found that a quantity equal to 945.76 cubic feet per second had to be taken by the relief sewer which, on its course to the south, receives additional discharges until at its outlet a capacity of 1,296.90 cubic feet per second is required.

Generally speaking, grades are good, and give high velocities—much above the orthodox sewer requirements. However, these sewers are idle most of the time, so that matters of wear and tear, due to high velocities, do not figure.

Starting at the lake (south end) at the 0+00 of Section No. 1, a headwall is provided for the 10-ft. 8-in. by 10-ft. 8-in. arch and invert culvert. This headwall with the apron is not designed as a permanent structure in view of a probable future extension into the lake to the sea-wall limit. Fig. 4 gives the details of headwall and apron. Fig. 5 shows the type sections adopted in Section No. 1. The flat top section was necessary in order to pass under the railway tracks and to get a minimum 4 feet of cover from top of sewer to base of rail, as required by the Railway Board, order No. 13494.

With the exception of the portion across the railway tracks the culvert was designed for tunnel work, and is being executed in that manner.

At King Street the high level interceptor had to be crossed, and special invert castings provided in order to keep grade in both sewers.

The existing sewers and proposed relief sewers draining into Section 2 presented difficulties which have been overcome in the manner shown in Figs. 6 and 7.

Fig. 6 shows the type of culvert adopted in this section of the work. From station 11+54 to 23+73 it will be seen that a small sewer is "tucked in" the wall of the culvert. This sewer has a flow in the same direction as the culvert, but as at a smaller grade. The type shown is for tunnel execution, the complete arch section of the top exterior being the main feature. At Queen Street (see Fig. 7) two syphons had to be constructed to take the sanitary sewage across the line of storm sewer. The grade of the existing Queen Street sewer did not permit of a sufficient hydraulic head being given so that excessively large diameter syphons had to be designed so as to permit any undue loss of head. A small overflow chamber is shown relieving the Queen Street sewer at this point.

At Argyle Street and Shaw Street (the end of Section 2) a large weir chamber is provided, as shown in Fig. 8. This is the overflow chamber for a proposed intercepting combined sewer, the sanitary flow from which is taken in the small sewer in the wall of the culvert to Queen Street and discharged there into the existing sewer via the syphon (to the north) shown in Fig. 7.