bervale Avenue. Another branch which the city contemplates building is on College Street running east and west from Montrose Avenue.

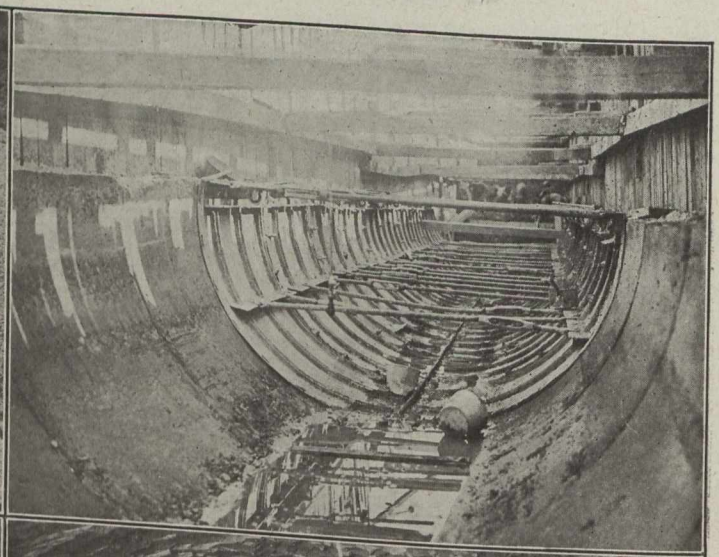
In the main Garrison Creek sewer, sections 1, 2 and 3 were entirely constructed in tunnel, with the exception of a few hundred feet in section No. 1, shafts being sunk at intervals, usually where the manholes are located, and headings driven each way from each. The excavation was brought to the surface by means of buckets or cars that were run on rails in the drifts. After a section of about 8 or 10 ft. had been excavated for walls and arch, forms were placed and concrete run in through a hole that had been previously bored from the street, a workman being stationed to spade the concrete and to see that it was properly placed. The excavation was carried on in the day time and concreting at night. After the allotted time for leaving forms in place (which was 48 hours at least) the forms were removed and 6-in. x 6-in. timbers were placed to protect the concrete from ground pressure until the invert was built. Ground pressure was very considerable in these sections as the material through which these sewers run is, in most places, a soft blue clay.

When the concreting of walls and arch had been completed between two shafts, the invert was concreted and brickwork laid, the 6-in. x 6-in. braces being removed as the work progressed.

It might be stated that the contractor on section No. 1 did not think it necessary at first to take any precaution against the ground pressure after he removed the forms, so he had a section to reconstruct as the walls "kicked in" to a considerable extent.

The design of sewer for these three sections (1, 2 and 3) was a culvert shape, with 18-in. class B concrete (1 : 3 : 5) in walls and arch, the invert being 14 in. of class B concrete and finished with paving brick to stand the wear of the water.

In section No. 1 there are four sizes, 10 ft. 8 in. x 10 ft. 8 in., 8 ft. 5 in. x 10 ft. 8 in. (reinforced under G.T.R. and C.P.R. tracks), 10 ft. 3 in. x 10 ft. 3 in., and 9 ft. 6 in. x 9 ft. 6 in. In section No. 2 there are two sizes, 9 ft. 3 in. x 9 ft. 3 in. and 8 ft. x 10 ft. The latter has a small oval sewer 1 ft. 9 in. x 3 ft. 0 in., alongside it to take care of the dry-weather flow from the Argyle Street section of the storm overflow sewer and convert it into the Queen Street sewer and thence into high level interceptor, through which it finds its way to disposal plant. Section No. 3 is constructed in two sizes, 10 ft. x 10 ft. and 9 ft. 6 in. x 8 ft. 4 in.



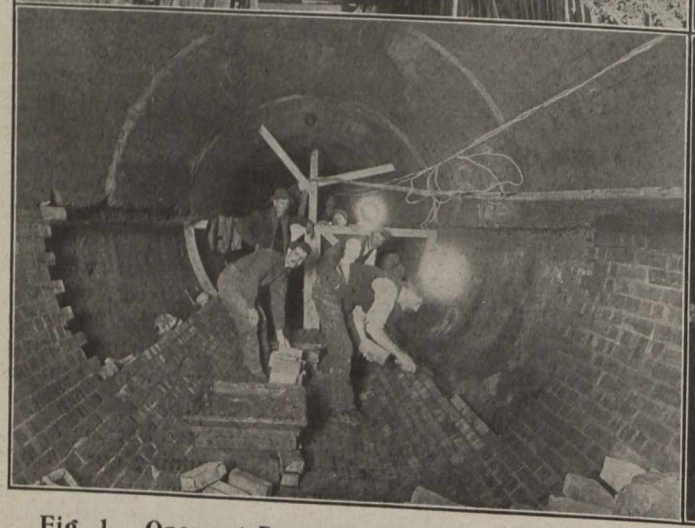


Fig. 1.—Open-cut Portion of Section No. 4, Showing Method of Mixing and Transporting Concrete.

Fig. 3.—Placing One Ring of Red Shale Brick in Invert After the Arch Had Been Completed. Section No. 4.

Fig. 2.—Main Garrison Creek Storm Overflow Sewer, Showing the Use of Steel Forms for the Invert.

Fig. 4.—Showing Method of Excavating in Tunnel, also Steel Circular Ribs and Lagging in Place. Section No. 4.