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LAYING A DEEP SEWER IN BAD GROUND.

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On one section of the sewerage scheme which has recently been carried out in North Toronto, and which was designed by T. Aird Murray, consulting engineer, Toronto, Ont., a part of the main trunk sewer is laid at a depth of about 30 feet. The following account of the work shows some of the difficulties which were encountered and the methods adopted in overcoming the same.

The sewer has a total length of nearly two miles; about 2,200 feet of this consists of 20-inch diameter pipes, and 7,000 feet of 24-inch, laid at a grade of 1 in 700. It passes through ground of varying character and at depths for the most part between 20 and 30 feet. Some of the deep work presented no special difficulty beyond hard picking and digging, but towards the lower end of the sewer, water and running sand interfered considerably with the progress of the work. The 20-inch pipes were laid during the summer weather, the greatest depth being about 24 feet, and the soil for practically the whole length of this part consisted of very hard clays and shale. Most of the trenching was done by short open cuts and tunnels about 20 feet long. The sides were so firm that no timbering beyond the stages for shovelling were required, and no water was encountered.

The sewer crosses a creek near where the 20-inch and 24-inch pipes join, and a little further on the ground quickly changes from the hard clay and shale to sand. The following section was laid during the fall of 1911; the greatest depth is about 24 feet, and although the greater part of the work was in sand, no timbering of any importance was required and the trench was free from water. A large part of this section also was carried out on the open cut and tunnel principle.

At the time these two sections were laid there was no outlet for the water at the lower end of the sewer, but pumping was not found necessary, as the trench was dry throughout the whole of the length.

The remainder of the 24-inch sewer, about three-quarters of a mile in length, passed through some bad ground and proved a difficult and costly piece of work. In November, 1911, although the main outfall sewer to which this section joins, was not completed, it was decided to proceed with this part of the work or, it was feared, a large part of the sewer system would be held up for want of an outlet. It having been ascertained by sinking trial holes that there would be water to contend with, a pit was sunk at the point of junction with the outfall sewer. A steam boiler and pulsometer were provided for dealing with the water, which was met

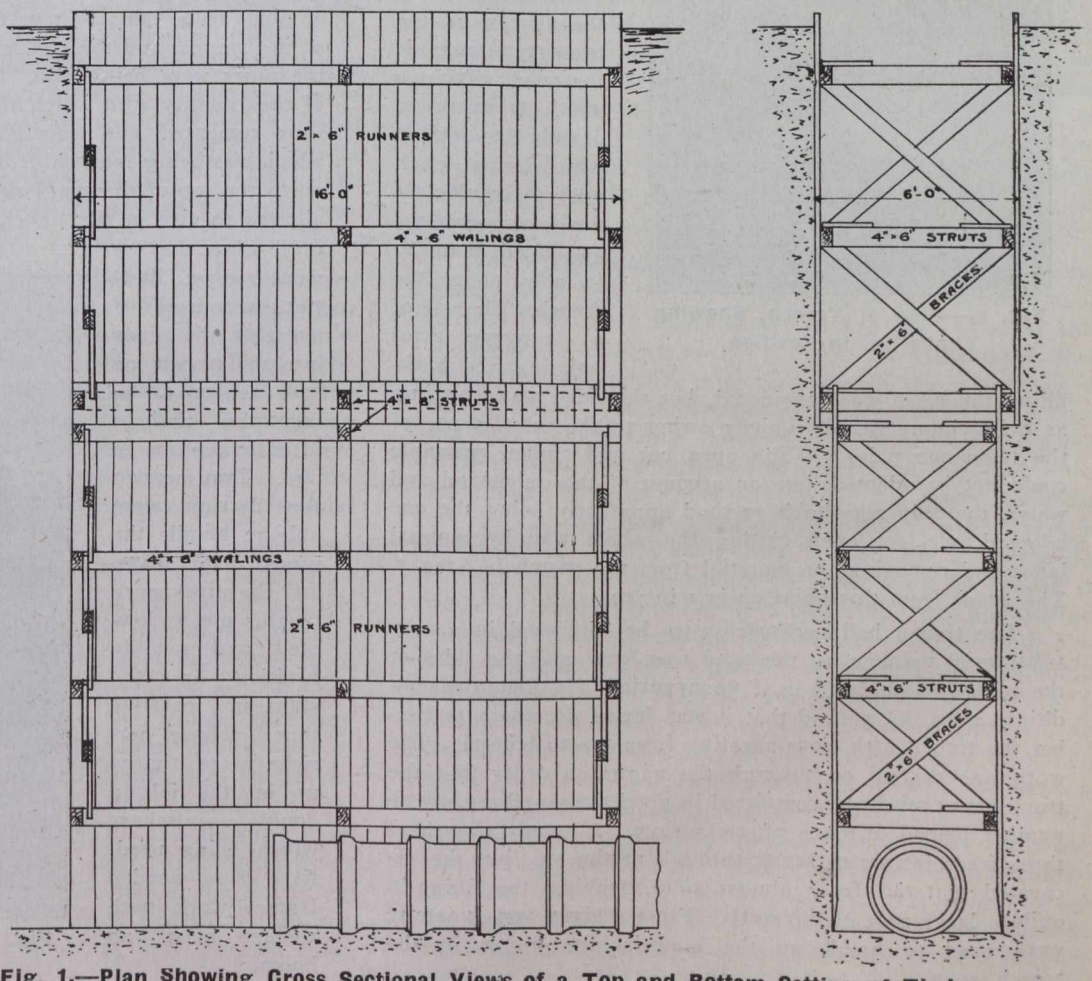

Fig. 1.—Plan Showing Cross Sectional Views of a Top and Bottom Setting of Timber.

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