

WINNIPEG-SHOAL LAKE AQUEDUCT CONSTRUCTION

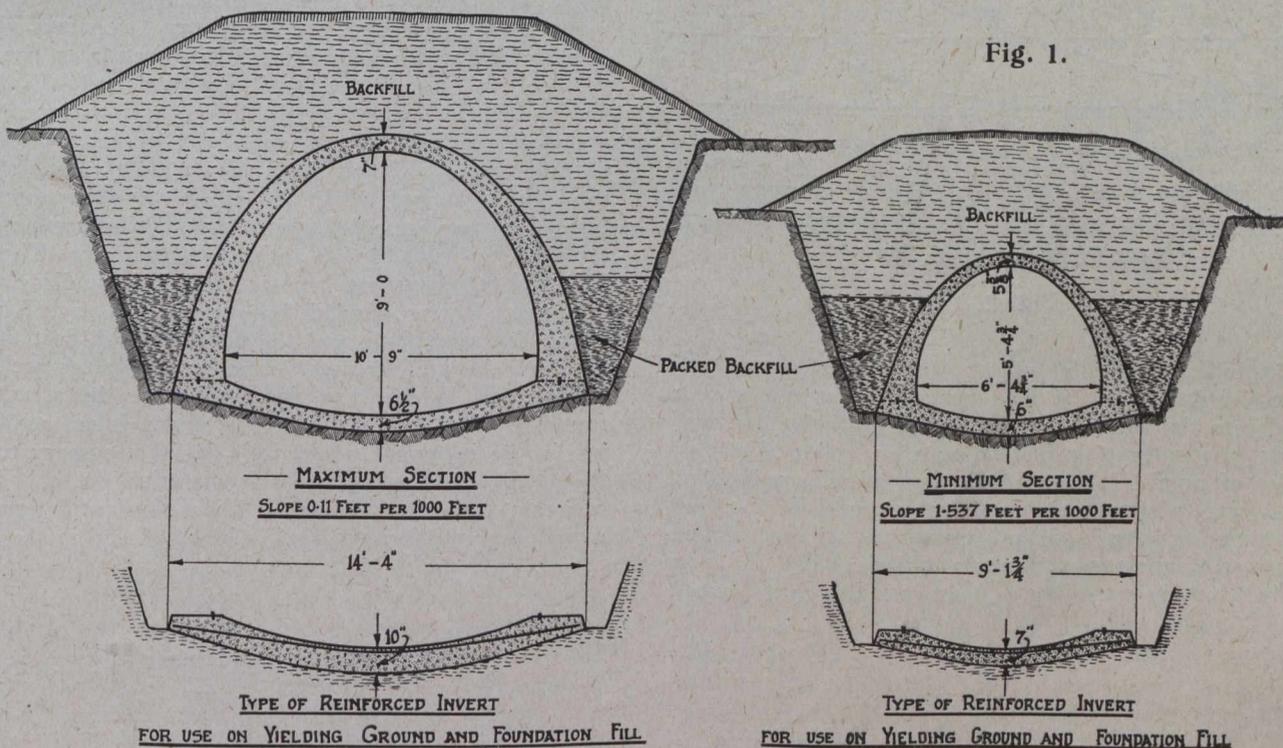
LOCATION, DESIGN, CONSTRUCTION METHODS AND FEATURES OF THE \$13,000,000 GRAVITY PIPE LINE THAT WILL SUPPLY GREATER WINNIPEG WATER DISTRICT WITH OVER EIGHTY MILLION GALLONS DAILY.

If all contracts are completed according to schedule, one-half of the Shoal Lake-Winnipeg aqueduct will be completed by the end of this month. By December 1st, 1917, eighty-five per cent. of the aqueduct must be finished, and it is expected that the whole work will be done by September 1st, 1918.

The progress of the work during the 1915 season was described and illustrated in *The Canadian Engineer* October 21st, 1915, issue, but the accompanying later photographs are of additional interest.

On account of the criticisms that have been made from time to time in Winnipeg regarding the design of

The comparative flatness of this slope and the necessity for holding the line as near to the average slope as possible rendered it extremely important to have even the preliminary field work carried out in an accurate manner. For this reason one field party was sent out with instructions to establish a line of precise level bench marks, which bench marks were located, as a rule, on the north and south provincial range and section lines at or near the intersections with the preliminary location. The other field parties then ran lines of levels along the north and south section lines, by means of which the general slopes of the country were quickly established. Contours plotted



the aqueduct, the following description of location, preliminary design, special features, etc., which has been abstracted from a paper presented to the Canadian Society of Civil Engineers by W. G. Chace, the chief engineer of the aqueduct, and D. L. McLean, assistant to the chief engineer, are of particular interest:—

Location of the Aqueduct Line.—The engineering force for the carrying out of the work was organized in the late fall of 1913, and work in the field and office was actively pushed forward to establish the final line. Five field parties were sent out on location for the purpose of obtaining a line with a continuous down-grade as near the average slope as possible between Shoal Lake and Winnipeg. It may be stated here that a line was secured in which more than 36 per cent. was practically on the average slope, while the actual increase in the length of the line over a direct air line is only 8 per cent. The difference in elevation between Indian Bay and the surface of the water in McPhillips Street reservoirs is 293 feet, and the length of the line 97 miles approximately—so that the average slope is 0.57 feet per 1,000 feet of length.

from these results showed that the country has a very gentle drop towards the northwest. When this mass of data was sent in to head office several trial lines were laid down and the field parties were instructed to run them out. At the same time cost curves were made up in head office showing the variation in the cost of the aqueduct structures at varying depths of excavation, and for varying sizes of aqueduct, the slopes ranging from one-tenth of a foot per thousand feet to one and one-half feet per thousand feet. By this means the separate field parties were then enabled to adjust the various lines to a minimum cost, taking into account all the varying items affecting such cost, such as the depth of cut, slope and length. Owing to the unsettled nature of the country the camps were practically isolated as communication had to be made by means of runners and supplies packed in on the backs of porters or by canoe up the Brokenhead and Whitemouth Rivers.

Owing to the flatness of the surface of the country the rain water does not drain off, and on account of the impervious subsoil, which consists of a sandy clay, large