

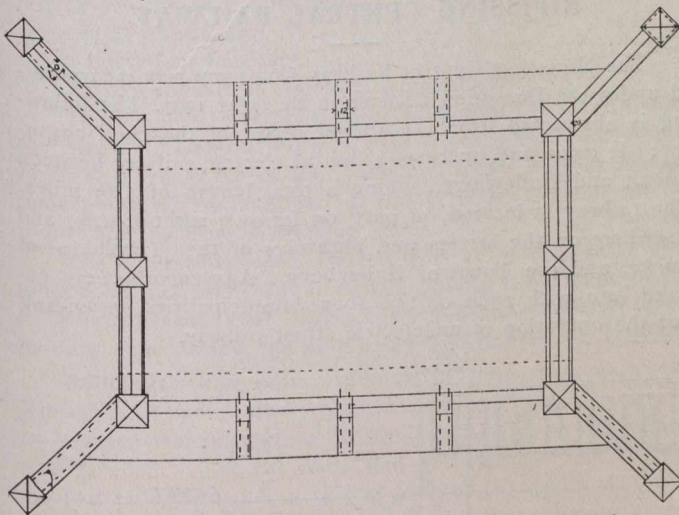
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REINFORCED CONCRETE ARCH, NORTH TORONTO

By E. A. JAMES, B.A.Sc.*

For the last year the wooden bridge which carried Albertus Avenue across a creek about a quarter of a mile west of Yonge Street has been in an unfit condition for traffic. As this road leads only to land that is just being opened up, the necessity for a bridge has not been felt.

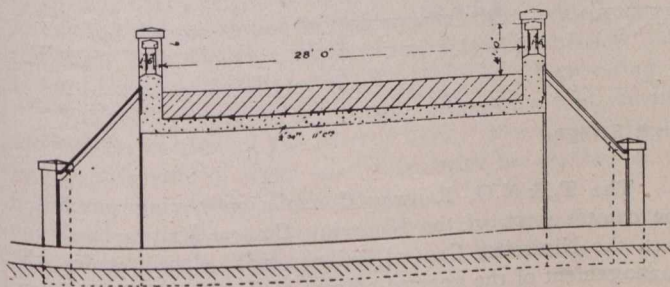


Plan of Bridge for Albertus Avenue, North Toronto.

In the spring of this year, however, it was decided to erect a permanent bridge and one which would harmonize with the surroundings.

The situation is a ravine about 20 feet deep and 150 feet wide. Through the ravine a stream flows in the fall and in winter freezes and forms an ice jam on a small scale. In the summer the bed is quite dry.

The type of bridge decided on was a reinforced concrete arch on abutment walls and with wing walls to hold back



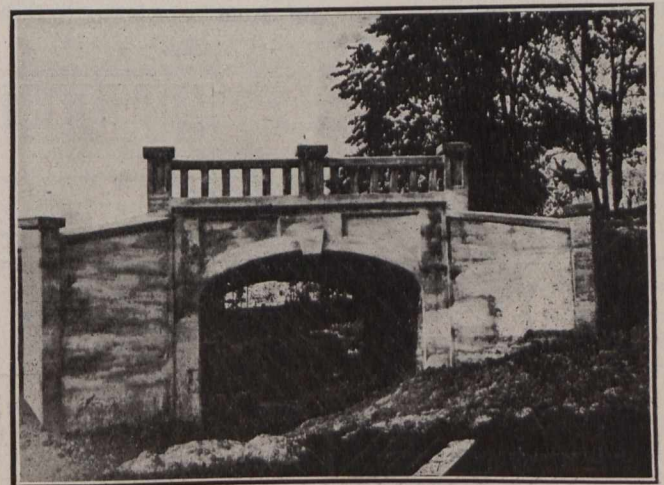
Longitudinal Section Through Bridge.

the fill. The span is 14 feet and the height from bed of creek to soffit is 12 feet. The clear width between parapets is 28 feet.

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The foundations were put in during wet weather and are 4 feet below datum (the bed of the stream). The material is a compact sandy clay. The original foundation designs were for a slab foundation 1 foot below datum, but on excavating this did not give a good enough bottom. A 2-foot bed of concrete was placed in the excavation and the foundation placed in this. The material was dumped down in barrow loads from a platform 10 feet high, on which the mixing was done. As the foundation was very soft, the concrete was put down as dry as possible. The concrete was mixed by hand in about $\frac{1}{4}$ yard batches, the proportions for the foundations being 1 of cement to 7 of pit gravel.

The forms were started about datum level, and consisted mostly of 2-inch by 4-inch uprights with 1 inch planed tongued and grooved boarding. The forms were strutted from



View of Bridge on Albertus Avenue, North Toronto.

the outside with 3-inch by 8-inch lumber, also tied together with wire spaced about 2 feet in either direction. The front forms of the abutment were carried up to springing level and also the uprights of the back, but the boards in the rear were put in as the concrete rose.

The reinforcement in the abutments is $\frac{1}{2}$ -inch twisted steel, spaced at 24-inch centres for the vertical rods and 12-inch centres for the horizontal rods. In the wings the reinforcement was $\frac{1}{2}$ -inch twisted rods at 12-inch centres both horizontally and vertically. The reinforcement for the wings was $\frac{1}{2}$ -inch twisted bars at 12-inch centres both horizontally and vertically tying into the abutments. As the space between the steel in the abutments and the forms was only 2 inches by 3 inches, it was found rather difficult to pack and work the concrete at the face, but good results were secured