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STRACHAN AVENUE BRIDGE, TORONTO

DESCRIPTION OF A BRIDGE IN WHICH THE DESIGN OF THE FLOOR SYSTEM PRESENTS SOME NEW FEATURES.

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THE Strachan Avenue bridge is over the Grand Trunk Railway, Toronto-Hamilton line, at the foot of Strachan Avenue, Toronto. This bridge replaces an old timber truss bridge which was completely worn out. There are several points in the design of the structure which may be of interest.

The bridge is a through plate girder type with a reinforced concrete floor and has all members below the floor encased in concrete. The abutments are 92 ft. 4½ ins. face to face of back walls and the bridge is 57 ft. 6 ins. centre to centre of handrails. There are two roadways 18 ft. 3 ins. curb to curb, and two 6-ft. (in the clear) sidewalks. The girders are 21 ft. 9 ins. centre to centre. The loading specifications (Fig. 2) are the Standard City of Toronto Class A. Provision was made in the steelwork for future possible street railway traffic, but no rails were laid.

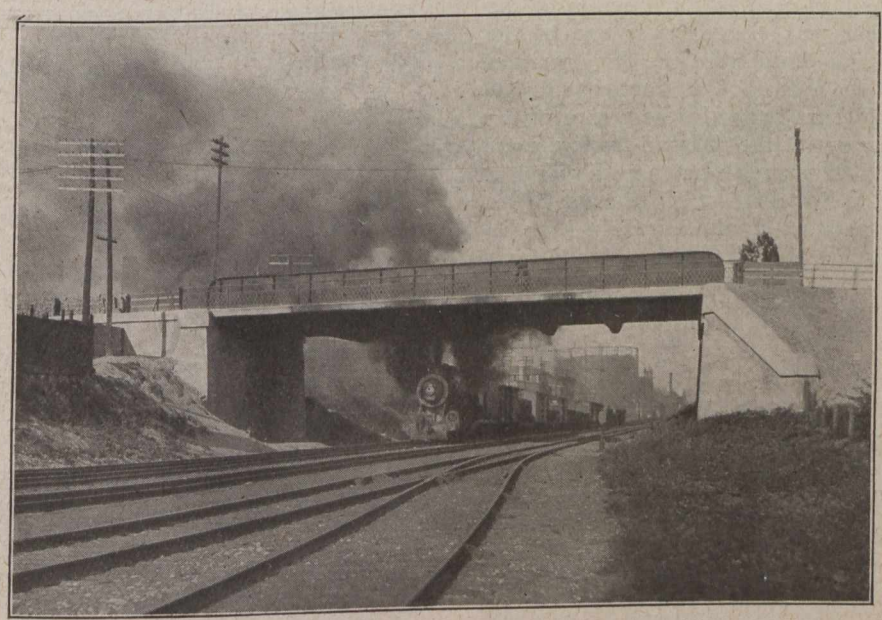

Fig. 1.—General View of Bridge, Looking East.

In a bridge of this type it is a difficult matter to obtain anything but a plain appearance. However, there are several features which very much improve the appearance and do not add very materially to the cost of the bridge. The 16-inch panelled facia girder along the front and the ornamental handrail (Fig. 9) both help in this respect. Fig. 1 shows a general view of the bridge, looking east.

The old timber bridge had head room clearance of 19 ft. 1 in. and space for four tracks. The new bridge gives a head room of 22 ft. 6 ins. and space for six tracks. This increase in height and width necessitated the raising of the grade on Strachan Avenue about 7 ft. at the north end of the bridge. On account of possible land damages, it was essential that this elevation of grade (on Strachan Avenue) should be kept to a minimum. To obtain this, a suspended floor beam type of floor was decided upon, with which it was possible to design a floor 2 ft. 3 ins. from top of paving to underside of floor. This type is only permissible where the tracks below are definitely located. The floor beams are placed so as to come centrally between tracks. This arrangement can be clearly seen in several of the accompanying views.

Fig. 3 shows clearly the structural details of the floor beam. The end connection angles rivet to a web plate which projects down through the bottom flange plates of the girder (Fig. 4), the notch allows for the outstanding flange of the girder and the holes in the gusset plate connect to a 7″ x 3½″ x ½″ stiffener angle on the girder. The stringers bear on the brackets shown on the web of the floor beam and for added general stiffness are also connected to the web with a pair of clip angles.

The centre girder, which weighs 36½ tons, is made up of a web plate 120″ x ⅜″ and flanges as follows: Two L's 8″ x 8″ x ¾″ with four 20″ x 11/16″ cover plates on top flange and two 20″ x ¾″ and two 20″ x 11/16″ cover plates on the bottom flange. The added section in the bottom flange takes the place of the section lost by cutting holes in the cover plates for the webs that carry the floor beams (Fig. 4). The outer girder, which weighs 26½ tons, is made up of a web 96 ″ x ⅜″ and flange of two L's 8″ x 8″ x ¾″ with two 18″ x ⅝″ and one 18″ x ½″ cover plates on the top flange and three 18″ x ⅝″ cover plates on the bottom flange.

The girders bear on cast steel bed plates. At the expansion end the sliding takes place between two phosphor bronze plates, one inset into the shoe plate and the other into the bed plate. Fig. 5 shows a view of the top of one of the bed plates and illustrates how the inset is machined. A groove on each side is first planed across the casting