Canadian Society of Civil Engineers.

ESTABLISHED 1887.

TRANSACTIONS.

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This paper will be read on Thursday the 12th May, 1887.

THE SUPERSTRUCTURE FOR THE LACHINE BRIDGE.

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The Lachine Bridge was first outlined, about four years ago, by Mr. VanHorne, of the Canadian Pacific Railway, but it was not until November of 1885 that the contract for the Superstructure was awarded to the Dominion Bridge Co. of Montreal, with Mr. C. Shaler Smith as consulting engineer, Mr. P. Alex. Peterson acting as chief engineer for the Railway Company. The designer of the bridge is the late Mr. C. Shaler Smith; M. Frank D. Moore, as chief assistant engineer, having full charge of the calculations and the details.

In adopting the lengths for the different spans at this crossing of the Saint Lawrence River, there was no precedent to guide the designer, excepting the lengths which had been adopted for the Victoria Bridge, which are as follows: 24 spans each 240 ft. centre to centre of piers, with one channel span of 350 ft. centre to centre of piers. In the Lachine Bridge we have eight spans of 240 ft. centre to centre of piers, two spans of 269 ft. centre to centre of piers, and two channel spans of 408 ft. centre to centre of piers. (See Plate I.)

The Lachine bridge begins properly at the first crossing of the Grand Trunk Railway, which is by an 80 ft. through girder. The next crossing is the Canal, which is a swing bridge 240 ft. long. The general design of this swing bridge is of the triangular pattern, known in Mr. Smith's office as the "Menomonee" type. This swing has a rim-bearing table turning on 34 wheels which are placed on a circular track, being operated by hand power or steam power from the centre. There are two classes of draw spans, rim-bearing and centre bearing, the centre-bearing being used for spans of short lengths up to 150 feet; for spans of longer lengths, it is general to use the rim-bearing, or the rim-bearing and the centre-bearing combined, it being easier to operate the rim-bearing swing for longer lengths. The first span of this pattern (the triangular) was designed by Mr. G. H. Pegram, M.A.S.C.E., formerly assistant to C. Shaler Smith for the Chicago, Milwaukee and St. Paul Ry. The advantages in this form of swing are in having low inclined chords at the ends, aiding in deflecting a possible derailed car which may strike the bridge, also in reducing the area exposed to wind pressure at the ends of the arms, making it easier to handle during high winds. The supposed advantage in avoiding all counter strains in this form of bridge, which Mr. Pegram had at first supposed to be the case, is not true. One particular feature in this span are the rocker links at the centre, which tend to equalize the pressure on the turntable, making the strains on the centre posts at all times alike in any one pair. (See Fig. 1. Plate II.) The ends of the arms, when the draw span is closed, rest on the crowns of inclined beds, which are set at a proper elevation to give the reactions necessary for a beam continuous over three level supports.

The heights are determined by calculation, and ample margin is made for any discrepancies in these heights due to unequal expansions from temperature, lack of uniformity in the elasticity of the material, or any imperfections in the workmanship.

After crossing the canal, we come to the river spans proper, which consist, first, of three 80 ft. deck plate girders, then the eight 240 ft. deck spans.

It might be stated in regard to the plate girders used in the Lachine Bridge, that they are all provided with rockers at the end supports, so as to allow any vertical movement in the girders themselves due to deflection from passing loads, or to neutralize any imperfections in the workmanship, which would tend to bring any undue pressure on the bed plates or expansion rollers.

This has been Mr. Smith's late practice for all girders above 50 feet, and was first used for the Denver and Rio Grande Railway in 1884.