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General Specifications for Steel Highway Bridges, Ontario, 1917

An Analysis of the 1917 Specifications Shows Many Changes and Improvements—
Recommended Length of Beam Spans Has Been Extended From 35 to 40 Feet

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DRESSED in the conventional garb of an official blue-book, the 1917 General Specifications for Steel Highway Bridges for Ontario, issued as an appendix to the annual report of the Department of Public Highways, does not present, at first glance, any striking difference from its predecessor of 1911. A closer inspection, however, discloses many marked changes and improvements.

The class of bridge over which the Department has supervision, and which this specification covers, is the town and county highway bridge pure and simple. Bridges carrying electric railways operating under provincial charters come under the Ontario Railway and Municipal Board's specification of 1916. This latter specification has a section devoted to movable bridges but as such bridges are almost invariably over navigable waters they, as well as all bridges over railways with Dominion charters, would have to comply with the 1908 specification of the Department of Railways and Canals. We thus have, it is to be regretted, three entirely different official specifications for highway bridges in Ontario. The one under review is limited strictly to the floors and superstructure of steel bridges carrying highway traffic only. A separate specification has been prepared for concrete bridges.

While the same general arrangement of the former specification has been adhered to it has been greatly improved by the re-grouping of clauses under their appropriate heads. Many ambiguous clauses have been rewritten altogether and other out-of-date ones have been cut down, revised, or omitted. Taken in detail, these

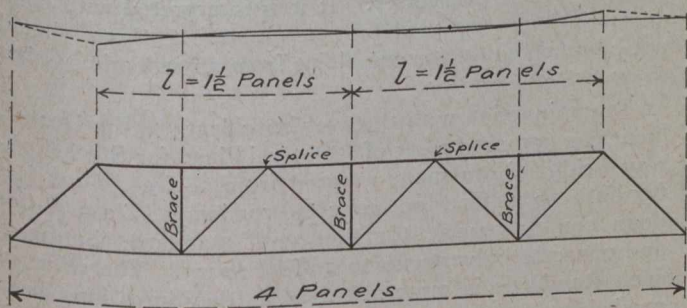


Fig. 1

little changes indicate the upward trend of practice in highway bridge construction which has been slowly going on for many years.

The recommended length of beam spans has been extended from 35 feet to 40 feet. Truss spans under 40 feet have been built in the past and, in fact, in the standards issued by the Department stress sheets are given for spans as short as 34 feet, but for such short trusses an extravagant amount of material is required to

obtain satisfactory results. The introduction of deep Bethlehem beams has made possible a 50-foot beam span, transportation facilities being the controlling factor.

Under the head "General Dimensions" the only change is in the minimum clear width of sidewalk, which is increased from 4 to 6 feet. The 4-foot walk was only

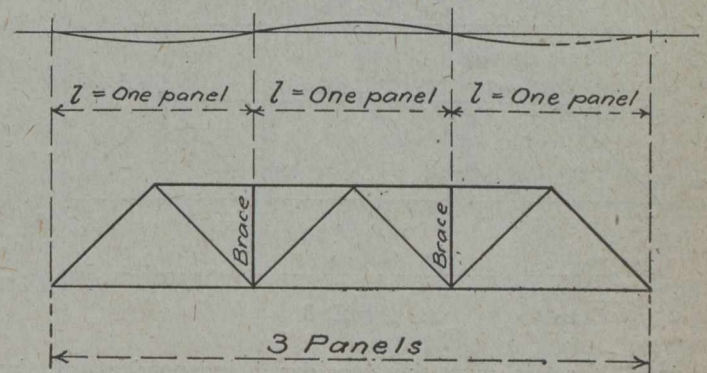


Fig. 2

an aggravation but, on the other hand, a 5-foot walk would be perfectly satisfactory in many localities. The extra foot on the side of a bridge costs considerably more in proportion than the increase in floor area, and it should not be added unless necessary.

The classification and loading of bridges is left unchanged but a little diagram has been added showing distribution for concentrated loads. The assumptions regarding wind loads have been revised and simplified. The whole load is now to be considered as a moving load and to be 300 pounds per foot on the loaded chord and half this amount on the unloaded chord.

Allowable unit stresses for steel and masonry are also left unchanged, but stresses for timber in bending have been added. These stresses are about what are commonly used for indoor construction and do not give much margin for the severe usage to which timber is subjected in a highway bridge. It would have been well to have given also allowable unit stresses in cross and longitudinal shear, as these are sometimes the controlling factors in the design of joist. The omission of unit compression stresses and column formulæ for timber may be justifiable in a steel bridge specification.

One of the most important innovations in the whole specification is the change in the clause relating to impact. This clause, as far as it relates to main members, reads:

"Impact shall be added to the maximum live load stresses. For stringers, floor beams, and hangers the impact shall be 30 per cent. of the maximum computed live load stress and for all other members . . . the impact to be added shall be 10 per cent. of the maximum computed live load stresses."