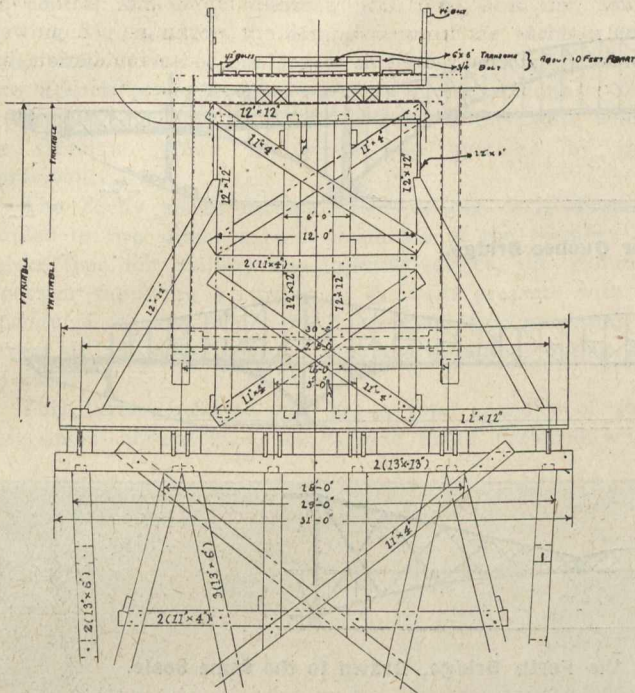


feet high, and the distance from rail level to ground was 90 feet at the highest point.

Now, as the lower trestles were 12 feet from centre to centre and upper trestles placed 4 feet apart, it was decided to place stringers on top of the main trestles, and to place decking on these stringers in order to distribute the weight.

Another branch railway ran under the viaduct and made the arrangement of the trestles at this point very difficult. No scaffolding was used during the process of erection. The trestles were fitted together under the



Transverse Section, showing Standard Trestle.

viaduct, one end being kept higher than the other during construction in order to facilitate the raising of same. The trestles when completed were raised by means of pulley and cable, the pulley being placed on the girders of existing viaduct, and rope being carried from trestle over pulley to a locomotive, and the engine started up the grade, and the trestles were carried up, one by one, and then laid close together, and afterwards spaced by means of two steam cranes on top of old viaduct, the trestle being slung at end of the jibs of the two cranes. All the timber used was sawn to a true cross-section, the method of half-timbers being employed.

### THE QUEBEC BRIDGE.

By Alfred J. Roewade.\*

Speculation as to the cause of the Bridge collapse seems now to have a tendency to settle down to a discussion of details and shop practice. The doubts in regard to the appropriateness of the general design being forgot. This induces me to ask your hospitality for an effort to revive the last question named.

My personal impression of the bridge design has, from the first look at it, been that it was proportionally too low, too flat and stretched to give the proper impression of strength for a span of that length. Yet as I, from merely practical investigations on other lines, know it to be too near the water line to serve its purpose properly, knew that it would act as a barrier to navigation, and gave public utterances to this my belief, I thought to have done my duty. The terrible fate, however, which so soon after struck the bridge while building, has revised my first impressions. Being habitually accustomed to judge designs according to their architectural appearance and to believe in demands requiring that all such structures should be built on lines which were able to impress the eye with the appearance of strength, not only indicating the ability to carry the load imposed upon it, but to do this with ease, I must confess that the Quebec

Bridge design, to me looked as if it would be unable to carry itself, let alone the live load of the traffic for which was to be built. The collapse has given a terrible confirmation to my suspicions and made me regret not having mentioned this side of the problem in time.

I know from experiencing the stubbornness reigning in the bridge engineer's office in regard to architectural demands, of experiencing how everything is ruled by shop practices and how impossible it is to make a bridge engineer listen to appeals in that line. With his mind perverted by onesided shop methods and details innumerable, he regards any criticism as to looks and appearances as crankish and ridiculous, while he at the same time admits that foreign bridge work is superior to the American in regard to appearance. He finds himself bound by the spell of common practice and knows that with few exceptions, the great men of his profession have become such by sacrificing the maxims of architecture for those of economy, and he does not want to go against the tide of professional opinion. The Quebec Bridge design is not among the worst examples, yet it shows the characteristic style developed in the bridge factory, and if we will compare it with that of the Forth Bridge, of which it is a modification, we will see how the strong monumental lines and general character of the prototype is wiped out, and no new or characteristic lines created to replace them. There is no doubt in my mind that if that particular member of the structure, which was found to show weakness before the collapse, had not shown this some other member would have done so, and the result thus have been the same. The strain diagram and all the calculations and figures may be in strict accordance with the developed practice, yet the collapse has proved that the calculations were applied to a faulty design and built on air. This being my belief I do not hesitate saying that awful as the price has been the experience will be worth it, if the profession takes heed of the warning and henceforth provides satisfactory designs for works of such immense importance.

The Quebec Bridge when built will be a truly national monument. It will be the main gateway of the Dominion, through which the official passage between the old and the new world is to come and go. Would it not be appropriate to make this gateway appear true to its character? Should not a design be found which without words could proclaim the free intercourse and hospitality, and should not that other design, which, to give it its right character, appears as a backyard fence with an opening left to crawl through, be discarded? It will, if used again, in order to prevent a second catastrophe, have to be strengthened so much that its economical features thereby will vanish, and the main reason for its existence thus cease to exist.

Whatever our opinion as to the value of the American style of bridge design may be, when this is compared to European examples, it must be remembered that both are the results of natural conditions. A new country is a problem and an old country is a study. We are living in a new country where everything has to be built from the bottom; and the vastness of it furthermore makes the task so enormous. Where the old country has one bridge to build we have a thousand and no time to deliberate on single cases and the consequences or relation to surroundings. While these are fixed in Europe and while they have plenty of time, we have to go ahead with the speed of the electric flash, and while we bridge a river in the wilderness today, this bridge may tomorrow be located in the middle of a busy city. Yet we must not forget that the effects of these different ways of doing things inevitably leads to different results. The enormous press of business has led us to adopt shop methods as governing the work—we had no choice—and blinded us to the demands of rational designs. This has produced the style of bridge building we are practicing to-day, a style which in its character has all the marks of **temporariness**. While on the other hand the more leisurely way in which they work out their bridge designs in Europe naturally tends toward **permanency** of the structures.

A consequence of our ways and their practical successes is that the designer imagines his work superior to that of his

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