

this you will see that in most instances it would not be possible to provide steel bearing plates sufficiently large to distribute the load. It is for this reason that the large concrete piers or abutments, which one sees at the ends of all bridges are built. The bearing power of concrete being about 29 tons per square foot, the loads from the bridge can be transferred by means of comparatively small plates to the abutments, which in turn through their vast area transfer their loads to the soil.

By the foregoing you will see that the structural engineer's work starts where the masonry engineer's work finishes. He, having no soil tests to make, starts out with the positive knowledge that his bridge will rest on piers capable of sustaining a load of 400 pounds per square inch. The only other information necessary is the total length of span. This information is, of course, supplied by the corporation purchasing the bridge.

If the bridge is to be built in Canada, it must be designed according to specifications prepared by the Department of Railways and Canals at Ottawa, or to some standard specification approved by it.

In these specifications will be found complete instructions for the design of any kind of bridge. A few of the most important or general instructions are given below.

1. Cross ties and guard timbers shall be southern long leaved pine or Douglas fir of British Columbia, white or red pine.

2. From centre to centre of through trusses the width shall not be less than one-twentieth of the effective span.

3. From centre to centre of decked pin connected or riveted trusses the width shall not be less than 10 feet nor one-fifteenth of the span.

4. Every bridge or structure through which a railway passes shall have an open or clear headway of at least seven feet between the top of the highest freight car used on the railway and the bottom of lower beams, members, or portions of that part of such bridge or structure over the railway.

5. Width of decked plate girders shall not be less than 8 feet from centre to centre of girders.

6. The depth of plate girders will be preferably one-tenth to one-twelfth of span.

7. The depth of beams in beam spans shall not be less than one-twelfth of the span.

In addition to these instructions, which must be followed in the design of the bridge, there are diagrams and tables showing the weight of an engine and tender and the load applied by a train of cars. The designing engineer must be thoroughly conversant with all these various instructions, for it is only by following them closely that he can compute accurately the