

The I-beam is more often found in upper lateral struts, where its use is quite as objectionable. Even if strong enough, which it seldom is, it is by no means the best section for that place, owing to the difficulty in connecting to the top chord. Where it rests on the chord plate, and is riveted thereto, the lateral rods being attached to the chord pins, there is a great leverage afforded to the wind stresses to distort the chord; and, where connected to the pin by a jaw, the detail has to be either very clumsy or very weak. Another objection to I-beams for lateral struts is the little room which there is in the flanges for punching rivet holes. But the chief one is the small resistance that they offer to the bending effect of the wind pressure when there is no vertical sway bracing. What has been said of I-beams in lateral struts can be said with much more effect concerning I-beams in portal braces, for great stiffness and strength are there necessary in order to carry the wind pressure upon the upper half of the bridge to the foundations.

The proper function of an I-beam is to resist deflection in the plane of its web: consequently it should be used as a floor beam, in which place its depth should seldom be less than ten inches, never less than nine inches. When one is debating about using such small floor beams, he should figure them for a concentrated wheel load, as well as for a uniformly distributed load.

About the only places where a small I-beam can be legitimately employed are between the pedestals, as a lateral strut at the fixed end of a span, or at the free end if the bridge be narrow and the span very short, and in vertical sway bracing as an intermediate strut.

For upper lateral struts, iron gas-pipe was formerly often employed, and is so yet to a certain extent. Regarded as a section, nothing could be better or more economical; but the connections made with it are very weak. Then, again, there is the objection that it is a closed column, and consequently inaccessible to painting. Notwithstanding the fact that two of the leading bridge companies of the United States employ almost exclusively closed columns, such columns are not, by engineers in general, conceded to be so good as open ones, which are always accessible to the paint-brush.