SWAY BRACING.

CXXX. The primary and essential purpose of a bridge is, to withstand vertical forces which are certain, and, to a large extent, determinate in amount. We can estimate nearly the weight of a train of rail road cars, a drove of cattle, or a crowd of people; and the amount of material required to sustain them.

But the lateral, or transverse forces to which a bridge superstructure is liable, are of a casual nature, depending upon conditions of which we have only a vague and general knowledge; and, can not predetermine their effects with any considerable degree of certainty.

We know full well from experience, that it is always expedient to provide every bridge superstructure with means of support against transverse horizontal forces; and we introduce certain parts and members for that express purpose. These have been frequently alluded to heretofore in this work, under the designation of sway-rods, lateral ties, or lateral braces. But no attempt has ever been made, to the author's knowledge, to point out the proper-sizes and proportions of such members, upon any determinate principles or data.

In this respect, reliance has mostly been placed upon "judgment," and general observation as to precedent and common practice; as was the case in fact, with regard to bridge construction generally, until within the last twenty-five or thirty years. Within this period, and since the extensive use of iron in bridge construction has been introduced, more attention has been given to scientific principles, in adjusting the proportions of the several parts and members designed to withstand the effects of vertical pressure.