bridge, the centre of gravity of the surface will be very high, and may be taken at the level of the top chord.

Estimating the side surface at 2000 square feet, and the force of a storm at 30 pounds per square foot, the total force will be 60,000 pounds horizontally.

The strain in the direction of the diagonal will be to this horizontal strain in the proportion of 23 to 15, it will consequently be 92,000 pounds.

The diagonal braces are 5×6, and 23 feet long.

If they are bolted together at their intersections, the resistance in the direction of a plane passing through them will be considerably greater than in a perpendicular. The estimate should of course be made in the direction of least resistance.

The least lateral resistance, when the two braces are bolted together, will be twice that of a post 23 feet long, 6 inches broad, and 5 inches deep. The limit of resistance, as determined by the formula $W = \frac{9000\, b\, d^3}{l^2}$, will be

$$W = \frac{9000 \times 6 \times 5^3}{23^2} = 12{,}500 \text{ pounds}$$

nearly; as this is the force that will actually cause the brace to yield by flexure, or the extreme limit of resistance, it will not be safe to allow more than 8000 pounds to each brace, if it acts singly, or 16,000 pounds if each pair is bolted; and as the force to be resisted is 92,000 pounds, there will be required in the first case 12 pairs of diagonal braces, and in the second case 6 pairs.

It appears, therefore, that a large amount of diagonal bracing is necessary to resist a strain capable of producing a pressure of 30 pounds per square foot. These braces cannot be permanently introduced until after the arches are in place, and the loss of the six spans at the Susquehanna Bridge was in consequence of the unfinished condition of the bridge, which did not admit of the permanent introduction of a sufficient number to resist the effects of the sudden and violent tornado to which it was exposed.