

*Vertical Pressure upon the Arch and Posts.*

The pressure of the arch in the direction of the tangent at the skew-back may be resolved into two components, one horizontal, and the other vertical; these will be proportioned to the perpendicular and base of a right-angled triangle, of which the face of the skew-back is the hypotenuse; and if the length of the hypotenuse be taken to represent the thrust of the arch, the base will represent the vertical pressure or portion of the weight sustained at that point.

The section of the arches at the ends is 40.6.

The hypotenuse of the skew-back 7.50.

The base of skew-back 4.03.

The proportion of surface which resists the vertical pressure  $\frac{40.6 \times 4.03}{7.50} = 21.8$  of iron, equivalent to 218 square inches of

wood. The cross-section of 4 posts, each  $4 \times 6 = 96$  inches.

Total resisting surface 314 square inches.

The weight being 96,443 pounds.

The pressure per square inch is 307 “

In the middle, the maximum pressure upon the posts can never exceed the amount previously determined as due to the weight upon one panel.

The posts at the ends containing 96 square inches, and the pressure per square inch being 307 lbs., the proportion of the weight sustained by the truss will be 29,472 lbs., which produces a pressure in the direction of the diagonal rods

$\frac{29472 \times 5}{4} = 36,840$  lbs. As the cross-section of the four rods

is 5 square inches, the strain per square inch will be 7,368 lbs.

The strain upon the counter-braces will be the same as in the other cases.

*General Summary of Results.*

No. of feet B. M. white-pine in one span	14,707
“ “ white-oak “ “	1,500