



NEW MILLENNIUM
BUILDING SYSTEMS
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APPLICATION NOTES

April 13, 2016

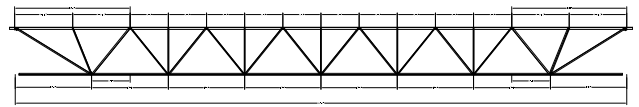
From straight to bowed joists: More than 14 tons of steel removed

For this facility expansion, nineteen 99-ft. long joists were value-engineered to remove 1,500 lbs. of steel per joist, resulting in an overall better looking roof design.

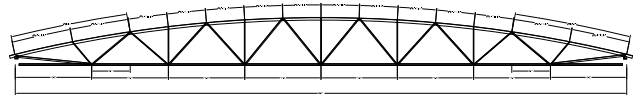
A large transportation facility needed a new building that required an open span of 99 feet wide. The standard parallel chord joists as specified required more steel than necessary, so there was an opportunity for the design to be re-engineered. The main challenge was improving upon the original Engineer of Record's joist design and geometry to decrease weight, retain function, and improve overall aesthetics.

Rising to the challenge to reduce weight

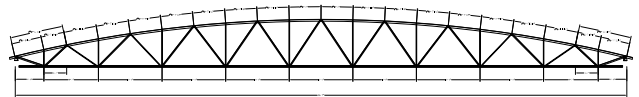
Bowstring joists measuring in at 99 ft. long and 90 in. tall at the widest point were used instead of the standard straight joists. To reduce the weight, loads were shifted to remove 1,500 lbs. of steel per joist from the initial designs. Additionally, this reconfiguration made the joists more aesthetically pleasing. To achieve this weight reduction, a bowed top chord was added to the design to offset a load being imposed on the bottom chord. This load was moved from the bottom chord to the top chord. The bowstring joists allowed the bottom chord panel point to be closer to the ends, making the web members smaller and tighter, thus removing steel. With the bowstring joists, loading is supported at the joist's interior, and the resulting roof design looks better aesthetically.



The initial parallel chord straight design included an extra 1,500 lbs. of steel per joist.



By using bowstring joists, the geometric angles were tightened up to make the chords and web members shorter. This change reduced the amount of steel needed.



In the final design, the bowing was less pronounced. The shortening of web members and tightening of the chords was slightly improved to remove more steel.



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