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Frequently Asked Questions

Exploring Truss Limitations by Ryan J. Dexter

When it comes to building with components, the only limit is your imagination. Here are some answers to questions that may reignite your creativity.

We often receive calls from homeowners, builders or building designers questioning whether or not a truss can work under a given set of conditions. WTCA technical staff's typical answer is, "You will be surprised what you can do with metal plate connected wood trusses." The following are some of the most common questions:

FIGURE 1

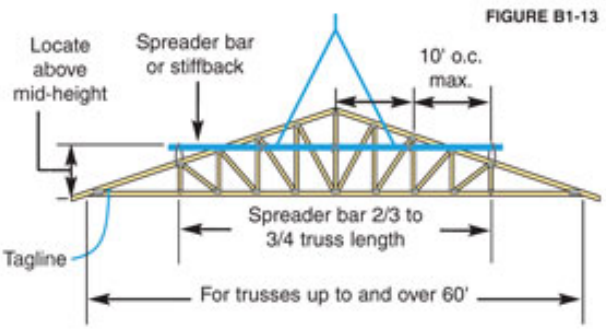

FIGURE 3

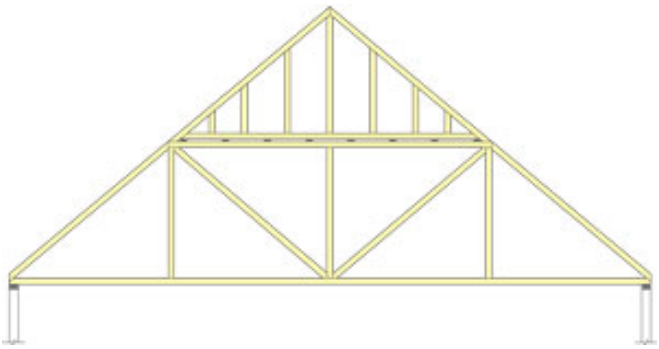

FIGURE 4

QUESTION:

Is there a limit on how long a truss can span? Can metal plate connected wood trusses be custom built to any

length? Can floor trusses span 30'? How long can roof trusses span? What should I consider when dealing with longer spans?

FIGURE 2

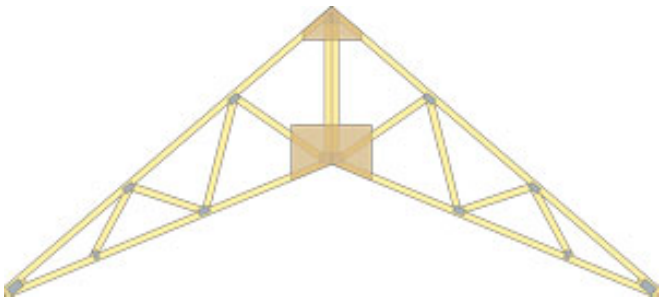

FIGURE 5

ANSWER:

The single most important benefit of a floor truss is the ability to span long distances, eliminating the need for interior bearing partitions or columns (Figure 1).

The spanning capability of a floor truss depends on loading, spacing, depth of the truss, materials and location of supports. In residential applications, typical floor truss clear spans are 20 to 30 feet. Floor trusses with clear spans up to 40 feet are possible but their required design parameters for on-center spacing, lumber grades and truss depth may be impractical.

If you are concerned about overall floor performance, you can employ measures at the front end of the design that enhance the minimum allowable building code performance. These include using a higher deflection criteria (l/480 or l/600 versus l/360), a deeper truss, which will improve strength and stiffness, a thicker floor sheathing that is glued and screwed instead of nailed, and properly fastened strongback bridging even if the underside of the truss is finished with a drywall ceiling.

Roof trusses provide great spanning capabilities. The typical roof truss spans fall in the range of 40 to 70'. However, it is possible to manufacture longer trusses as was described in an April 2001 article ("Yes We Can" by Brigit Frank) describing the construction of a 98-foot truss shown at right in Figure 2.

If you are working with trusses over 60', the truss installation process becomes more challenging and requires a spreader bar be used at two-thirds to three-fourths of the truss length to prevent lateral bending. The spreader bar should be located at or above the mid-height of the truss to prevent overturning and should be attached to the top chords and webs at ten-foot intervals as shown in Figure 3.

It is also extremely important to following the specific temporary bracing plans outlined in the construction design documents. These bracing plans will typically be based upon the Building Component Safety Information (BCSI 1-03) booklet. In the case of trusses over 60', BCSI states that a Professional Engineer should prepare the specific temporary bracing plan.

An example of a temporary bracing plan for long span trusses was featured in last month's issue of SBC Magazine (March 2004, p. 22).

Question:

Excluding the additional material cost, what are the other implications in designing a truss steeper than 12/12?

Answer:

Once the truss reaches a height of around 12 to 13' it may become impractical to build the truss in one piece due to manufacturing or shipping restrictions. This problem is generally solved by building the truss in two layers and assembling it on site. This is referred to as a piggyback truss (Figure 4).

If you intend for the truss to be vaulted, a piggyback may not work due to limited depth. In this case, the truss could possibly be built in two halves which can then be "field spliced" together on site (Figure 5).

From a structural standpoint, one implication to consider when constructing trusses with steeper pitches is that longer webs may require more lateral bracing than is typical.

To pose a question for this column, email us at faq@woodtruss.com. To view other questions visit the WTCA website.

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