Question of the Day: Lateral restraints. What, where, when, why…and by whom?

By: Stan Sias, Simpson Strong-Tie National Manager, Plated Truss Industry

We have all seen the truss design drawings where there are a slew of Continuous Lateral Restraint (CLR) indicators on the webs indicating that they need someone's attention. Does that someone (most likely the installation contractor) know what you know about the need for this special attention? Are they going to install the CLRs and necessary diagonal bracing to permit your trusses to perform as designed? Let's have a look at the 5Ws.

What is a lateral restraint?
The Building Component Safety Information booklet defines lateral restraint as a structural member (typically lumber or metal) installed at right angles to a chord or web member of a truss to reduce the laterally unsupported length of the truss member (ANSI/TPI 1 has similar language). The lateral restraint is required to reduce the buckling length of the member in question, but what makes it become 'continuous'? Continuous restraints happen when there are several like members in a row needing the same buckling length reduction.

Where do lateral restraints need to be placed?
The location(s) of lateral restraints depends on the forces within the member. When the forces exceed the limit for the member length, a single restraint will be tried at the member centerline. If the force is still too high, a second restraint will be located at the member third-points. ANSI/TPI 1 -2007, Chapter 2 places the responsibility for specifying the location(s) of required permanent individual truss member restraints on the truss designer or truss design engineer. The method of restraint is the responsibility of the building designer. By reference, ANSI/TPI 1 is a part of both the IBC® and IRC®.

When do lateral restraints become necessary?
Lateral restraints (and diagonal bracing) become necessary to prevent deformation when lateral loads are applied to the member and/or the accumulation of compressive forces within the member exceeds limits. Different species, sizes and grades of lumber have differing compressive strengths.

Why do we need lateral restraints? Can't they be designed out of the truss?
Many times it simply depends upon your objective when designing/bidding the job as to whether you try to eliminate or minimize the number of lateral restraints required. If low price is your objective then you're probably not going to bother to flip, up-grade or up-size the web to eliminate the necessity. If, on the other hand, you've discussed this with your customer and have promised to eliminate them whenever possible, you'll do whatever it takes to get rid of them. When they are necessary, you'll want to share that with your customer so that they cover the material and labor for the known CLRs.

Where does it state whose responsibility it is to install the lateral restraints and associated diagonal bracing?
The 'Who' question is also answered in ANSI/TPI 1, Chapter 2. Sections 2.3.4 & 2.4.4 clearly specify that the installation of temporary installation restraint/bracing for the truss system and the permanent truss system lateral restraint and diagonal bracing for the completed building is the responsibility of the contractor.

Let's assume for a minute that the required lateral restraints are not installed. Now what? My friend, Dave Motter, PE, at Louws Truss in Burlington, WA addressed this topic during a presentation at the

2010 BCMC. Dave reported that load-carrying capacity of a truss without required CLRs installed could be reduced by as much as 75%. Does anyone think that the installation contractor knows that? Does the building official know that? What about the building designer? How do we think the occupants of the building would feel about this 'cost-saving' measure being taken with their building project?

This raises a few more questions and may warrant a discussion on the topic with your best customers:

1. What do CLRs really cost the installation contractor and does he willingly accept that cost?
2. How is the installation contractor supposed to know what restraint and bracing is required when bidding the job before the deferred truss submittal is available?
3. What price is the customer really looking for when they ask you to produce a bid? Do they really want the lowest invoice price or are they more interested in the total job cost at the end of the project? After all, it is that price that determines if the job was profitable or not.

Having these types of conversations with your customers is rarely detrimental to your relationship. It may even provide you with an advantage over your competitors. Good things happen when customers know that you've got their back. In addition, the education they get from the conversation will help ensure that the required CLRs will actually get installed.