Technical Q & A

Web Plane & Gable End Frame Bracing

by Larry Wainright

When bracing in web planes and gable ends per BCSI is required.

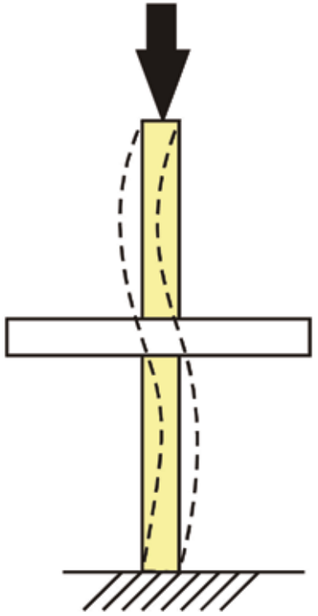

Figure 1. A restraint prevents a truss member from bucking out of plane from large compressive forces.

at a glance

- The building designer should specify permanent building stability bracing on the construction documents.
- If the building designer does not provide this bracing on the construction documents, the IRC 2006 specifies that BCSI must be followed.
- Wind and seismic loads applied to the gable frame laterally need to be resisted as shown in Figure 4.

Question

I am an experienced contractor who has been framing houses for the past ten years. I always install truss bracing as shown on the truss design drawings. Recently, my building official told me that I must add additional bracing as shown in the BCSI documents shipped with my trusses. This involves cross bracing in the web plane and gable end bracing. Is this really necessary? It adds time and expense to my projects and I have never had a problem with the trusses on my jobs.

Answer

The answer as to whether or not additional bracing is necessary depends on the project, the truss type, the loading conditions, etc. The BCSI documents (based on the BCSI parent booklet, *Guide to Good Practice for Handling, Installing and Bracing of Metal Plate Connected Trusses*) are usually shipped with the truss delivery in a package that contains, among other things, the industry recommended practice for installing permanent bracing. According to the 2006 International Residential Code (IRC), Section R802.10.3, trusses must be braced to prevent rotation and provide lateral stability in accordance with the requirements specified in the construction documents and on the individual truss design drawings. According to the IRC, if specific bracing requirements are not provided by the building designer on the construction documents, the trusses are to be braced per BCSI. It must be noted that the truss design drawings do not show permanent building stability bracing or bracing required to prevent rotation. Truss design drawings only show the location of the restraint required to prevent individual truss members (i.e., chords or webs) from buckling out of plane due to the compression forces within the member (see Figure 1).

Other permanent building stability bracing is needed and should be specified by the building designer on the construction documents. The size of the restraint and the connection of the restraint to the trusses is not normally specified on the truss design drawing. Again, these items need to be specified on the construction documents by the building designer. If the building designer has not provided the necessary information on the construction documents, then the requirements in BCSI must be followed.

According to BCSI-B3, Permanent Restraint/Bracing of Chords and Web Members, trusses must be braced on the top and bottom chords as well as the web planes (see Figure 2). Since the roof and ceiling planes are often covered with structural sheathing that act as bracing, additional bracing may not be required. However, web member bracing is often overlooked. It is essential to the performance of the building for web plane bracing to be properly installed. The continuous lateral restraints (CLRs) that are installed to prevent individual truss members from buckling (due to compressive forces in the web members as shown on the truss design drawings) can also be used by the building designer to transfer lateral forces (wind and seismic) through the truss system to the building lateral force resisting system (shear walls, diaphragms, etc).

In addition, these web member planes need to have diagonal bracing installed at intervals to allow the forces accumulating in the CLRs to be transferred to the roof and ceiling diaphragms, to provide stability to the truss system, and to prevent

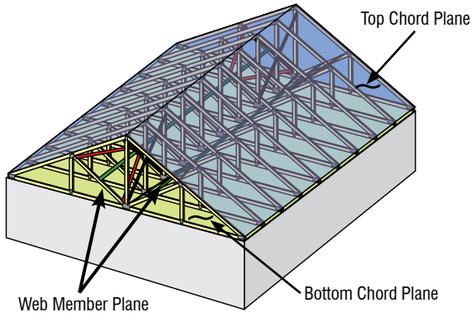

Figure 2. Trusses require permanent bracing within all three planes.

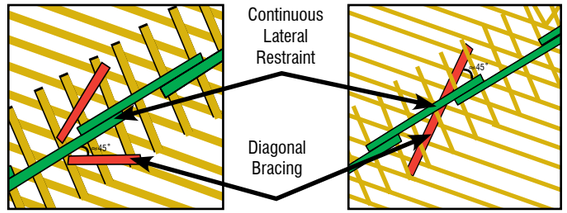

Figure 3. Examples of diagonal bracing with one row of continuous lateral restraint.

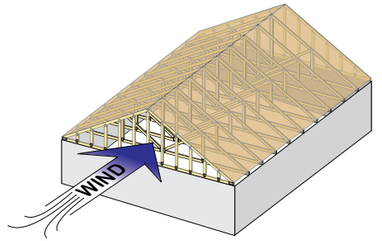

Figure 4. Building designers should specify how gable end frames are to be braced to transfer lateral loads such as wind.

rotation and prevent lateral displacement of the webs. The diagonal bracing should be installed as close to a 45-degree angle as possible to the CLRs and be attached as close to the CLRs as possible. Further, they should cross at least three similar trusses and be attached as close to the roof and ceiling diaphragms as possible (see Figure 3). If this is not possible, webs can be individually reinforced by other means.

Gable end bracing is another area that is often overlooked. Truss suppliers often supply gable end frames as a convenience to the contractor. Like trusses on the building, the truss designer designs the gable end frame for the loads in the plane of the truss. Loads applied to the gable frame laterally, such as wind and seismic loads, need to be resisted with CLRs and diagonal bracing (see Figure 4). Again, the building designer is responsible for designing the building stability bracing, including the gable end bracing. For more detailed explanations of these concepts, see all of the BCSI documents at www.sbcindustry.com/bcsi.php. SBC

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