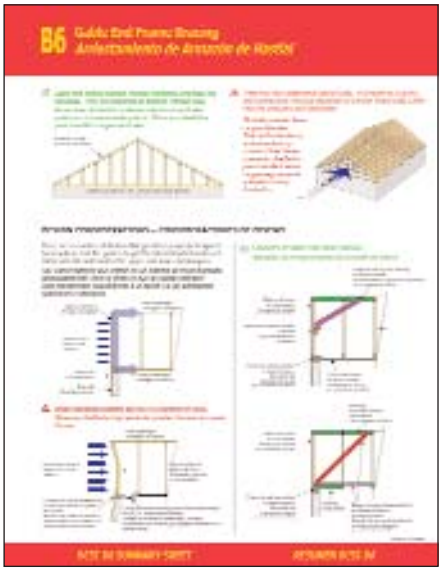
Wtca Update

Proper Construction of Wood Framed Gable End Walls with Wood Roof Trusses

by WTCA Staff

Questions about framing gable end walls with scissors or vaulted ceiling roof trusses is a frequent topic for WTCA's technical department. BCSI-B6 was created to help!



One of the common questions that we have to address is the common practice of incorrectly framing gable end walls when scissors or vaulted ceiling roof trusses are used. This article provides our industry's current guidance on this issue.

WTCA's publication BCSI-B6 Gable End Frame Bracing is intended to provide general considerations and details surrounding the proper bracing of gable end conditions. A B6 summary sheet is also available, which is intended to guide framers. For web site links to each of these documents go to **Support Docs** at **www.sbcmag.info**.

The key issues regarding gable end wall-bracing follow:

1. The Building Designer (i.e., the Owner, Architect, Engineer or Contractor of the Building) knowing the intended flow of loads for the entire building, is responsible for taking the resultant loads from the gable end frame and transferring the loads to the footings. This may involve transferring the loads through additional bracing from the gable end frame to the roof and ceiling diaphragms (e.g., roof sheathing and gypsum ceiling).

2. The effect of wind on an improperly braced gable end wall can be seen in the Figure 1 (BCSI-B6 graphic).

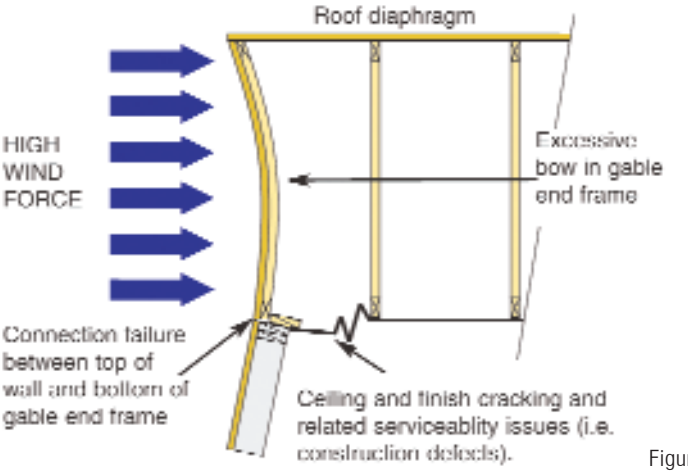


Figure 1.

3. The goal of gable end wall bracing is to provide resistance to high wind forces in a manner similar to the graphic that follows. Ultimately, how this bracing is actually detailed for the structure is the responsibility of the Building Designer (see Figure 2 on page 29 - BCSI-B6 graphic).

4. In the field, it is standard practice for carpenters to frame the gable wall top-plate at the same height as the nearby bearing wall top-plate height. Then they install a flat bottom chord gable truss on top of this wall top-plate. Using this framing technique, the gable wall top-plates will not match the ceiling planes of an adjacent scissor or vaulted truss. This will cause a hinge effect under certain wind loads as shown in Figure 3 on page 29.

at a glance

- ❑ Gable end bracing design is the responsibility of the building designer.
- ❑ The Wood Frame Construction Manual provides prescriptive guidance on for the size, spacing and length of gable end wall studs to resist bucking due to wind loads.
- ❑ BCSI B6 Gable End Frame Bracing is intended to provide general considerations and details surrounding the proper bracing of gable end conditions.

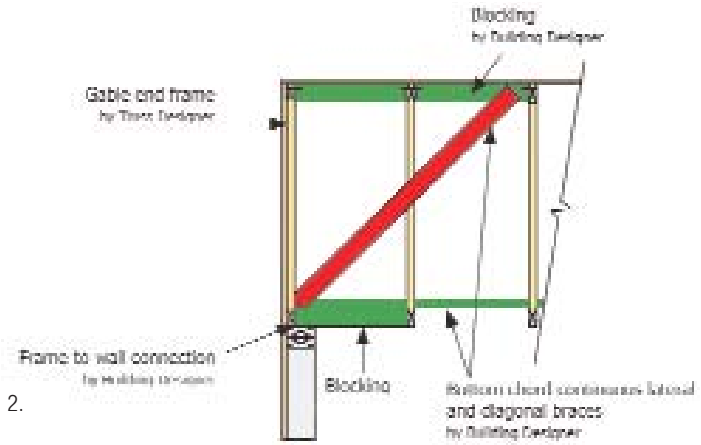


Figure 2.

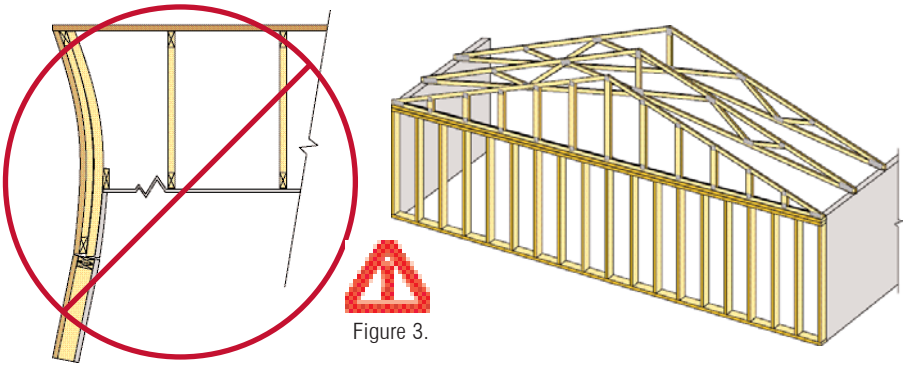


Figure 3.

5. This situation can be resolved by constructing a gable end wall that matches the ceiling profile of the cathedral or vaulted ceiling, using full height studs extending up to the bottom chord of the gable end truss. The truss manufacturer can then construct a gable end truss with the same profile as the adjacent roof truss. A wood nailer must then be added to the top of the wall to support the ceiling finish. This is illustrated in Figure 4 below. An added benefit to this is the reduced risk of a crack developing in the corner of gypsum ceilings due to wood shrinkage.

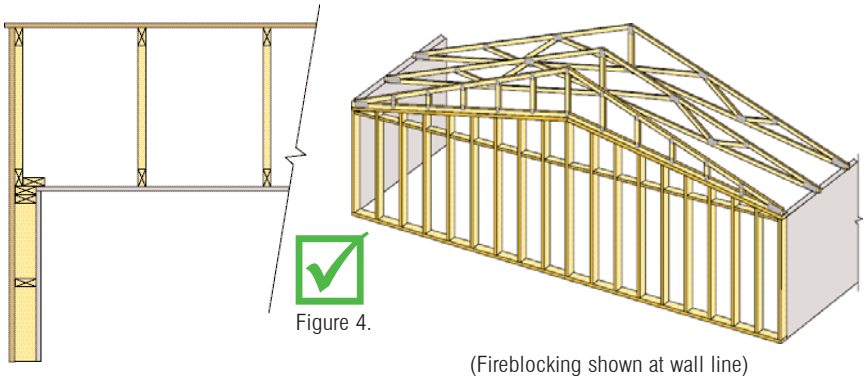


Figure 4.

(Fireblocking shown at wall line)

Note: IRC R602.8 Fireblocking required. Fireblocking shall be provided to cut off all concealed draft openings (both vertical and horizontal) and to form an effective fire barrier between stories, and between a top story and the roof space. Fireblocking shall be provided in wood-frame construction in the following locations.

1. In concealed spaces of stud walls and partitions, including furred spaces and parallel rows of studs or staggered studs as follows:

1.1. Vertically at the ceiling and floor levels.

1.2. Horizontally at intervals not exceeding 10 feet (3048 mm).

Continued on page 30

Continued from page 29

6. Since many of these walls will be constructed with studs taller than 8 or 9 feet, stud buckling and bending due to wind may become a design issue. It may become necessary to increase the stud size or decrease the stud spacing. The Wood Frame Construction Manual (WFCM), which is referenced in the IBC section 2301.2.3 and IRC section 301.1.1 for conventional light frame wood construction provides stud spacing, size and height guidance (see WFCM Tables 3.20A&B for Exposure B and Tables A3.20A&B for Exposure C. Exposure Categories are defined in the IRC section R301.2.1.4 and IBC section 1609.4. Exposure B is the default category unless the site meets the definition of another exposure. Exposure B is for typical urban and suburban sites or wooded areas that have obstructions about the size of single family dwellings or larger.

Table 1 below applies to the following field conditions:

- Foam sheathing can be used everywhere except within 4 feet of the end wall corners.
- Foam sheathing can be used within 4 feet of each end wall corner, if studs are spaced at 0.85 times the table's stud spacing.
- The stud spacing for the wall can be the same across the entire wall, if 3/8 inch wood structural panels are applied within 4 feet of each end wall corner.

If your field conditions do not meet the foregoing conditions of use for Table 1, it will be necessary to contact the Building Designer to determine the proper stud size and grade to transfer the load to the foundation. Additionally, longer studs, than those found in this table, can easily be designed to meet your application. **SBC**

To order BCSI documents, visit www.woodtruss.com/pubs.

Maxmimum allowable stud length for gable endwalls for interior zone loads.

(Based upon WFCM 2001, Tables 3.20A)

Apply to either of the following conditions per footnotes:

Table 3.20A, a - "Maximum stud lengths in Table 3.20A are based upon interior zone loads and assume that all studs are sheathed with minimum sheathing material. Studs within 4 feet of corners shall be sheathed on the exterior with a minimum of 3/8 inch wood structural panels and on the interior with minimum sheathing material, or stud spacings shall be multiplied by 0.85 for framing located within 4 feet of corners to account for the additional end zone requirements. The additional bending capacity provided by the wood structural panels or reduced stud spacing is assumed to be sufficient to resist the additional end zone loading requirements."

(minimum exterior sheathing would include foam, fiber, or gypsum sheathing)

(minimum interior sheathing would include gypsum board thickness based upon stud spacing)

(wood structural panels would include plywood or OSB)

Length is given in ft-in. Maximum allowable stud length is 20 feet.

Stud Spacing (in.)	Species	Grade	Wind Speed (3 second gust) Exposure B								
			90			100			110		
			2x4	2x6	2x8	2x4	2x6	2x8	2x4	2x6	2x8
12	Hem-Fir	#3/Stud	14-0	20-0	20-0	12-6	18-9	20-0	11-3	17-0	20-0
	SPF	#3/Stud	14-0	20-0	20-0	12-6	18-9	20-0	11-3	17-0	20-0
	SP	#3/Stud	14-11	20-0	20-0	13-4	20-0	20-0	12-1	18-4	20-0
	Hem-Fir	#2	14-7	20-0	20-0	13-6	20-0	20-0	12-8	20-0	20-0
	SPF	#2	14-11	20-0	20-0	13-11	20-0	20-0	13-0	20-0	20-0
	SP	#2	15-8	20-0	20-0	14-6	20-0	20-0	13-7	20-0	20-0
16	Hem-Fir	#3/Stud	12-0	18-0	20-0	10-8	16-1	20-0	9-8	14-6	18-9
	SPF	#3/Stud	12-0	18-0	20-0	10-8	16-1	20-0	9-8	14-6	18-9
	SP	#3/Stud	12-10	19-6	20-0	11-5	17-5	20-0	10-4	15-8	20-0
	Hem-Fir	#2	13-2	20-0	20-0	12-3	19-8	20-0	11-5	18-5	20-0
	SPF	#2	13-6	20-0	20-0	12-7	20-0	20-0	11-9	18-10	20-0
	SP	#2	14-2	20-0	20-0	13-2	20-0	20-0	12-4	19-9	20-0
24	Hem-Fir	#3/Stud	9-8	14-6	18-8	8-7	12-11	16-8	7-9	11-8	15-1
	SPF	#3/Stud	9-8	14-6	18-8	8-7	12-11	16-8	7-9	11-8	15-1
	SP	#3/Stud	10-4	15-8	20-0	9-3	14-0	18-1	8-4	12-7	16-4
	Hem-Fir	#2	11-5	18-4	20-0	10-7	17-1	20-0	9-11	15-6	20-0
	SPF	#2	11-9	18-10	20-0	10-11	17-6	20-0	10-2	15-9	20-0
	SP	#2	12-3	19-9	20-0	11-5	18-4	20-0	10-8	16-7	20-0

Table 1.

WTCA Publications Changes

Take note of the following recent changes to WTCA publications. Four documents in the Truss Technology in Building (TTB) series will no longer be sold; instead, they will be provided at no charge in printable PDF format on the web site:

- Commentary to National Design Standard and Recommended Guidelines on Responsibilities for Construction Using Metal Plate Connected Wood Trusses
- Fire Rated Truss Assemblies
- Lumber Grades
- Sprinkler Systems & Wood Trusses

The National Design Standard and Recommended Guidelines on Responsibilities for Construction Using Metal Plate Connected Wood Trusses has been retitled, *Standard Responsibilities in the Design Process Involving Metal Plate Connected Wood Trusses.* The following text was added to the front page of the brochure:

"In 1995, the Wood Truss Council of America (WTCA) published WTCA 1-1995, Standard Responsibilities in the Design Process Involving Metal Plate Connected Wood Trusses. WTCA 1-1995 was published through an open consensus based committee approach and provided a guideline involving responsibilities associated with the use of metal plate connected wood trusses in construction. As of November 2004, WTCA 1-1995 has been incorporated into Chapter 2 of the ANSI/TPI 1-2002 consensus standard and as such is part of the IBC and IRC building codes where ANSI/TPI 1-2002 is referenced. The following text has been reproduced from ANSI/TPI 1-2002, Chapter 2 with permission from the publisher, the Truss Plate Institute (TPI), www.tpinst.org."

Component manufacturers now have more than one option for printing plans on a plotter. The B1 Summary Sheet on a roll is now available in two- and three-inch core sizes, both with 144 impressions per roll (24"x150').

Consult the WTCA Products and Services catalog (polybagged with the April issue of SBC) for detailed descriptions of all products. Visit www.woodtruss.com/pubs to place your online order today. SBC

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