

A building inspector raises several critical issues regarding bracing and bracing inspections.

Key Industry Definitions from ANSI/TPI 1

BUILDING DESIGNER: The Owner of the Building contracts with a Registered Design Professional for the design of the Building Structural System and who is responsible for the Construction Documents.

BUILDING STRUCTURAL SYSTEM: The completed combination of structural elements, trusses, connections and systems, which serve to support the building's self weight, the applicable live load(s), and environmental loads.

CONSTRUCTION DOCUMENTS: Written, graphic and pictorial documents prepared or assembled for describing the design (including the Framing Structural System), location and physical characteristics of the elements of a Building necessary to obtain a Building Permit and construct a Building.

TRUSS DESIGN DRAWING (TDD): A type of construction document that includes the written, graphic and pictorial depiction of each individual truss.

at a glance

- There are many guidelines and recommendations in place to ensure trusses are installed and braced properly.
- Truss Design Drawings show the truss calculation and engineer stamp, but usually show limited bracing.
- It is our hope that BCSI recommendations are followed in the field, but we cannot enforce them.

by Ryan J. Dexter, P.E.

Many of the calls and emails that we receive involve jobsite conditions and scope of work questions. Many times they are directly from the inspector signing off on a particular project. A building inspector in Colorado recently submitted the following question to *SBC*.

Question

I have noticed that when engineered trusses are shipped to the job, their Truss Design Drawings have the proper truss calculation and engineer stamp, but usually show limited bracing and seem to rely on a preprinted item showing the nailing of the roof sheathing and ceiling wallboard to be the limit of what they do. Most include the preprinted BCSI-B1 summary sheet, but for the most part it is ignored and the contractors brace whatever suits their fancy. When an inspection is called for, it is usually passed. What kind of response do you have about this issue? To me the truss is the most important part of the entire structure.

Answer

Because the inspector's email raises several critical issues regarding bracing and bracing inspections, we will address the questions point by point:

Point #1: *To me the truss is the most important part of the entire structure.*

We agree that the truss is one of the more important parts of the structure. It is amazing to us how often buildings are designed with trusses being designed by others far after the original design of the building was done. We would prefer to see the truss design process done at the inception of the building design process. Unfortunately, the market ultimately controls; owners/contractors generally do not want to work with a component manufacturer up front in the design process because they believe bidding the work out later will get them the lowest possible price. However, it is not often considered that this practice may also result in a building design that is less than optimal.

Point #2: *The Truss Design Drawings generally have the proper truss calculation and engineer stamp but usually show limited bracing and seem to rely on a pre-printed item showing the nailing of the roof sheathing and ceiling wallboard to be the limit of what they do.*

To address this point, we need to begin with a discussion of building design and the information provided by the Building Designer (see definition in sidebar). It is important to note that residential jobs in many states do not require the Building Designer to be a Registered Design Professional (RDP), and in these cases, the role and definition of Building Designer changes per ANSI/TPI 1-2002 (TPI 1). You can see this in the definitions below.

For structures that require an RDP, the definitions of Building Designer and Truss Design Engineer are as follows (note that the Truss Designer is referred to as a Truss Design Engineer in this case):

BUILDING DESIGNER: The Owner of the Building contracts with a Registered Design Professional for the design of the Building Structural System and who is responsible for the Construction Documents.

Continued on page 14

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TRUSS DESIGN ENGINEER: The individual or organization responsible for the design of trusses. Each individual truss design drawing shall bear the seal and signature of the Truss Design Engineer.

For structures that DO NOT require an RDP, the definitions of Building Designer and Truss Designer are as follows:

BUILDING DESIGNER: The Owner of the Building or the individual or organization that contracts with the Owner for the design of the Building Structural System and/or who produces the Construction Documents.

TRUSS DESIGNER: The individual or organization responsible for the design of trusses.

In this discussion, we are referring only to projects that require a Registered Design Professional. The relationship between the Truss Design Engineer and Building Designer for these projects is as follows:

The Truss Design Engineer gets as much information from the Building Designer as possible to properly design the individual trusses for the Building. This includes the material/system that will be used to sheath the roof of the structure and detailing of the ceiling membrane.

According to ANSI/TPI 1 Chapter 2, which is adopted by reference in several 2003 IRC Sections, the following define responsibilities of the Building Designer with regard to what needs to be provided to the Truss Designer, including bracing:

ANSI/TPI 1-2002 Section 2.5.2 The Building Designer...shall provide the following:

.....**2.5.2.7** Proper transfer of design loads affecting the Structural Elements and Trusses;

2.5.2.8 Adequate connections between Trusses and between Structural Elements...but not Truss to Truss girder connections...

2.5.2.9 Permanent bracing design for the Building...[This is the permanent building stability bracing that is required so that the building can resist all the applied lateral loads, which includes the roof and ceiling diaphragms along with the lateral load resisting elements that are used throughout the rest of the structure.]

2.5.3 The Building Designer shall be responsible for the adequacy of the design of the Building Structural System [and]...shall evaluate the effect of the Trusses and the Structural Elements supplied, on the Building Structural System.

Typically, the truss top chord and bottom chord are fully braced with properly fastened sheathing. The only other bracing that is required is the lateral restraint bracing that prevents a web member from buckling and the location of this bracing is shown on the Truss Design Drawing (see definitions in sidebar).

The Truss Manufacturer/Truss Designer's scope of work follows:

ANSI/TPI 1-2002 Section 2.7
TRUSS MANUFACTURER RESPONSIBILITIES

2.7.6 The Truss Manufacturer shall manufacture the Trusses in accordance with the final Truss Design Drawings, using the quality criteria required by this standard (ANSI/TPI 1-2002).

ANSI/TPI 1-2002 Section 2.8
TRUSS DESIGNER RESPONSIBILITIES

2.8.1 The Truss Designer shall prepare the Truss Design Drawings based on the Truss design criteria and requirements set forth in writing by the Owner, Building Designer or Contractor, by the Structural Design Documents, and in conformance with the requirements set forth in this standard (ANSI/TPI 1-2002).

2.8.2 The Truss Designer shall be responsible for the single Truss design depicted on the Truss Design Drawing.

Thus, the Building Designer and Truss Design Engineer have very specific responsibilities with respect to bracing that if executed properly on the jobsite, should result in a correctly braced structure.

Point #3: ...most include the BCSI-B1 summary sheet but, for the most part it is ignored and the contractors brace whatever suits their fancy.

Truss manufacturers will generally send a jobsite package with every job. This package is intended to provide guidance should the contractor have questions on how to handle, install and brace the truss properly. Jobsite packages ordered by manufacturers from WTCA contain BCSI-B1 through B4 summary sheets, which contain jobsite information illustrating proper handling, installing and bracing of trusses. In any event, truss manufacturers have to otherwise assume that contractors are competent to undertake the work they have agreed to do on any given project. If contractors require assistance in some aspect of the construction project, then they need to find the help they need from a competent party.

ANSI/TPI 1 provides that installation materials be given to the contractor and calls out BCSI as a reference for installation.

ANSI/TPI 1-2002 Section 2.6.1 Truss Submittals and Structural Element Submittals, and any supplemental information provided by the Truss Manufacturer, shall be provided to the Contractor or the individual or organization responsible for the installation of the Trusses and Structural Elements.

Adapted from ANSI/TPI 1-2002 Section 2.6.5 The Contractor is responsible for construction means, methods, techniques, sequences, procedures, programs and safety in connection with the handling, storing, installation and bracing of the Trusses. These topics are covered in the BCSI 1-03: Guide to Good Practice for Handling, Installing & Bracing of Metal Plate Connected Wood Trusses. The Contractor is responsible to carry out the construction work related to the Trusses and the Structural Elements in accordance with the handling and installation information and/or the Structural Design Documents.

WTCA recommends that all component manufacturers distribute jobsite packages, but the manufacturer bears no responsibility to enforce the guidelines within BCSI, especially since they are not typically present on the jobsite during the installation.

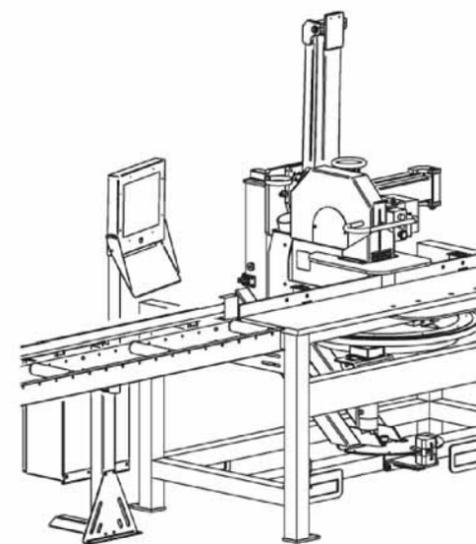
Continued on page 64

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Technical Q&A

Continued from page 14

Point #4: *When an inspection is called for, it is usually passed.*

The inspection process is the last line of defense for a properly built structure. The building official has the following responsibilities per the 2003 IRC:

SECTION R104:

DUTIES & POWERS OF THE BUILDING OFFICIAL

R104.4 Inspections. The building official is authorized to make all of the required inspections, or the building official shall have the authority to accept reports of inspection by approved agencies or individuals. Reports of such inspections shall be in writing and be certified by a responsible officer of such approved agency or by the responsible individual. The building official is authorized to engage such expert opinion as deemed necessary to report upon unusual technical issues that arise, subject to the approval of the appointing authority.

SECTION R109: INSPECTIONS

R109.1 Types of inspections. For onsite construction, from time to time the building official, upon notification from the permit holder or his agent, shall make or cause to be made any necessary inspections and shall either approve that portion of the construction as completed or shall notify the permit holder or his or her agent wherein the same fails to comply with this code.

R109.1.4 Frame and masonry inspection. Inspection of framing and masonry construction shall be made after the roof, masonry, all framing, firestopping, draftstopping and bracing are in place and after the plumbing, mechanical and electrical rough inspections are approved.

SECTION R110: CERTIFICATE OF OCCUPANCY

R110.1 Use and occupancy. No building or structure shall be used or occupied, and no change in the existing occupancy classification of a building or structure or portion thereof shall be made until the building official has issued a certificate of occupancy therefore as provided herein. Issuance of a certificate of occupancy shall not be construed as an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction. Certificates presuming to give authority to violate or cancel the provisions of this code or other ordinances of the jurisdiction shall not be valid.

Exception: Certificates of occupancy are not required for work exempt from permits under Section R105.2.

The questions posed by this inspector and others have served as the catalyst for the creation of WTCA *Technical Notes*. The goal of WTCA *Tech Notes* is to provide commentary on key industry technical issues to help clarify the intent of language, provide a truss industry perspective, and help educate the marketplace as structural building components are deployed. All Tech Notes can be viewed online at: www.sbcindustry.com/technotes.php. Contact rdexter@qualtim.com if you have a topic that could be covered in a *Tech Note*. **SBC**

To pose a question for this column, call the WTCA technical department at 608/274-4849 or email technicalqa@sbcmag.info.

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