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TRUSS INDUSTRY STANDARD OF CARE ISSUES

by Scott D. Coffman, PE., SECB & Jim Vogt, PE.

PART 5

Production builders and developers began to encourage building material supply (BMS) companies to deliver a “dried-in” framing package in the late 1990s. This presented an opportunity for a BMS to sell manufactured and/or inventoried products and the labor to install them. Many BMSs began to offer “installed sales” as an avenue to capture large-volume customers and increase company revenue. Although the term “BMS” may be synonymous with any organization or company that provides installed sales, in the context of this article, “BMS” is used to reflect the primary audience associated with the wood truss industry offering this service. Additionally, many BMSs have a truss and/or wall panel division or resell truss and wall components that become part of the installed-sale framing package.

It is judicious for BMSs that coordinate building framing and install building components to be knowledgeable of applicable code sections, industry standards and manufacturer instructions. With respect to wood trusses, the *2012 International Building Code (IBC)*¹ contains numerous sections that pertain to metal plate connected wood truss installation. Six sections address the primary standard of care issues that may be unfamiliar to many BMSs. Section 2304.9.6² and 2304.9.7³ address load path and framing requirements.

2304.9.6 Load path.⁴ Where wall framing members are not continuous from foundation sill to roof, the members shall be secured to ensure a continuous load path. Where required, sheet metal clamps, ties or clips shall be formed of galvanized steel or other *approved* corrosion-resistant material not less than 0.040 inch (1.01 mm) nominal thickness.

2304.9.7 Framing requirements.⁵ Wood columns and posts shall be framed to provide full end bearing. Alternatively, column-and-post end connections shall be designed to resist the full compressive loads, neglecting end-bearing capacity. Column-and-post end connections shall be fastened to resist lateral and net induced uplift forces.

Section 2308.10.1 speaks to wind uplift and truss connections.

2308.10.1 Wind uplift. The roof construction shall have rafter and truss ties to the wall below. Resultant uplift loads shall be transferred to the foundation using a continuous load path. The rafter or truss to wall connection shall comply with Tables 2304.9.1 and 2308.10.1.⁶

Section 2303.4, 2306.1, and 2308.10.10 (including associated commentary) reference *ANSI/TPI 1 The National Design Standard For Metal Plate Connected Wood Truss Construction (TPI 1)*⁷ making it part of the building code.

2303.4.6 TPI 1 specifications. In addition to Sections 2303.4.1 through 2303.4.5, the design, manufacture and quality assurance of metal-plate-connected wood trusses shall be in accordance with TPI 1. Job-site inspections shall be in compliance with Section 110.4, as applicable.

2306.1 Allowable stress design. The design and construction of wood elements in structures using allowable stress design shall be in accordance with the following applicable standards:

Truss Plate Institute, Inc.⁸

Editor's Note:

The purpose of this article series is to identify truss-related structural issues sometimes missed due to the day-in and day-out demands of truss design/production and the fragmented building design review and approval process. This series will explore issues in the building market that are not normally focused upon, and provide recommended best-practice guidance. As with the previous articles (November and December 2014, March and April 2015), the objective is to raise awareness of these issues and, ultimately, improve overall quality of truss roof and floor system construction.

¹ publiccodes.cyberregs.com/icod/ibc/2012/index.htm

² publiccodes.cyberregs.com/icod/ibc/2012/icod_ibc_2012_23_par099.htm

³ publiccodes.cyberregs.com/icod/ibc/2012/icod_ibc_2012_23_par099.htm

⁴ publiccodes.cyberregs.com/icod/ibc/2012/icod_ibc_2012_23_par099.htm



TPI 1 National Design Standard for Metal Plate Connected Wood Truss Construction

2308.10.10 Wood trusses. Wood trusses shall be designed in accordance with Section 2303.4.

Many BMSs may be familiar with *TPI 1* in terms of truss fabrication requirements but unfamiliar with the content of this standard as it pertains to standard responsibilities in the design and application of trusses.

First, Chapter 2 in *TPI 1* contains language applicable to a BMS providing a framing package that includes wood trusses. Specifically, Section 2.3.4 delineates contractor responsibilities with respect to truss installation.

2.3.4 Requirements of the Contractor.

2.3.4.1 Information Provided to the Truss Manufacturer.

The Contractor shall provide to the Truss Manufacturer a copy of all Construction Documents pertinent to the Building Structural System and the design of the Trusses

(i.e., framing plans, specifications, details, structural notes), and the name of the Building Designer if not noted on the Construction Documents. Amended Construction Documents upon approval through the plan review/permitting process shall be immediately communicated to the Truss Manufacturer.

2.3.4.2 Information Provided to the Building Designer.

The Contractor, after reviewing and/or approving the Truss Submittal Package, shall forward the Truss Submittal Package to the Building Designer for review.

2.3.4.3 Truss Submittal Package Review.

The Contractor shall not proceed with the Truss installation until the Truss Submittal Package has been reviewed by the Building Designer.

2.3.4.4 Means and Methods.

The Contractor is responsible for the construction means, methods, techniques, sequences, procedures, programs, and safety in connection with the receipt, storage, handling, installation, restraining, and bracing of the Trusses.

2.3.4.5 Truss Installation.

The Contractor shall ensure that the Building support conditions are of sufficient strength and stability to accommodate the loads applied during the Truss installation process. Truss installation shall comply with installation tolerances shown in *BCSI-B1*. Temporary Installation Restraint/Bracing for the Truss system and the permanent Truss system Lateral Restraint and Diagonal Bracing for the completed Building and any other construction work related directly or indirectly to the Trusses shall be installed by the Contractor in accordance with:

- (a) The Construction Documents, and/or
- (b) The Truss Submittal Package. For Trusses clear spanning 60 ft. (18 m) or greater, see Section 2.3.1.6.

2.3.4.6 Pre-Installation Check.

The Contractor shall examine the Trusses delivered to the jobsite for:

- (a) Dislodged or missing connectors,
- (b) Cracked, dislodged or broken members, or
- (c) Any other damage that can impair the structural integrity of the Truss.

2.3.4.7 Post-Installation Check.

The Contractor shall examine the Trusses after they are erected and installed for:

- (a) Dislodged or missing connectors,
- (b) Cracked, dislodged or broken members, or
- (c) Any other damage that can impair the structural integrity of the Truss.

2.3.4.8 Truss Damage Discovery.

In the event that damage to a Truss is discovered the Contractor shall:

- (a) Ensure that the Truss not be erected, or
- (b) That any area within the Building supported by any such Truss already erected shall be appropriately shored or supported to prevent further damage from occurring and shall remain clear and free of any load imposed by people, plumbing, electrical, mechanical, bridging, bracing, etc. until field repairs have been properly completed per Section 2.3.4.9.

2.3.4.9 Truss Damage Responsibilities.

In the event of damage, the Contractor shall:

- (a) Contact the Truss Manufacturer and Building Designer to determine an adequate field repair, and
- (b) Construct the field repair in accordance with the written instructions and details provided by the Truss Manufacturer, Building Designer, and/or any Registered Design Professional.

2.3.4.10 Responsibility Exemptions.

The Contractor is responsible for items listed in Section 2.3.4, and is not responsible for the requirements of other parties specified outside of Section 2.3.4.

The definition of a contractor as described in *TPI 1* states in part, “The term contractor shall include those **subcontractors** who have a direct Contract with the Contractor to construct all or a portion of the construction” [emphasis added]. In essence, a BMS accepts responsibility to meet building code, industry standards, and manufacturer information when installing trusses. A BMS offering this service is encouraged to read Chapter 2 of *TPI 1* to fully appreciate the building code/law and scope of work responsibilities their organization is undertaking by adding installed truss sales to their business.

The key concept behind the standard responsibilities document, first created by the Wood Truss Council of America (the predecessor to SBCA) in 1995, is to have precise definitions with respect to scope of work. This precision encourages everyone in the construction market to know the responsibility they are taking and then to get paid fairly for it and its associated risk. As a corollary, it is also important to not allow one’s scope of work to

⁵ publiccodes.cyberregs.com/icod/ibc/2012/icod_ibc_2012_23_par100.htm

⁶ See online version of the article for links to these tables.

⁷ *ANSI/TPI 1-2007*

⁸ tpinst.org

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Standard of Care Issues

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creep (i.e., increase), while also coming with the expectation that you will do the additional work for free. This is how the industry has often reduced the value of responsibilities performed and increased its risk that it also is not getting compensated for properly.

Second, a BMS that offers and provides installed wood truss sales has a unique opportunity to ensure proper truss bracing, connections and load paths are present. Here is a quick snapshot of some responsibilities a BMS accepts with respect to a truss package when providing this service.

1. The BMS is responsible to satisfy all truss installation requirements located on the truss placement diagram, each truss design drawing, *TPI 1*, *BCSI* and the construction documents. This includes, but may not be limited to:
 - a) Implementing and/or adhering to all relevant truss installation notes located on each truss design drawing and the construction documents. Examples include truss-to-truss connections, minimum bearing width, strongbacking installation and gable end wall bracing.
 - b) Proper installation of truss lateral restraint and diagonal bracing as detailed on each truss design drawing, contained within the construction documents or *BCSI* prescriptive methods.
 - c) Installing truss-to-wall connectors to resist calculated truss uplift reactions as required in *IBC* Section 2308.10.1. Knowledge of wall framing and/or wall panel materials affords the BMS (and truss supplier) to recognize insufficient tie-down connectors. When a reaction exceeds a prefabricated metal connector specified, the BMS has the responsibility to contact and resolve the issue with the building designer.
 - d) Perform a truss pre-installation check and post-installation check to identify dislodged or missing truss connectors, broken members,

or any other damage that may impair truss structural integrity.

- e) Obtain an adequate truss repair, when appropriate, and make the repair in accordance with written instructions.

2. Ensure a gravity and uplift load path (*IBC* Section 2304.9.6) is continuous from the roof to the foundation. This is critical at girder truss reaction points where truss tie-downs align and/or are traced to hold-downs at the foundation. Additionally, blocking and connectors must be installed, as required, to transfer load from one level to the next. Truss and/or engineered wood products personnel employed by a BMS should have the training and expertise to recognize significant loads that must have a load path from the roof to foundation.
3. Ensure adequate connections are made to the structure to resist the maximum horizontal reactions due to lateral loads applied to the trusses.
4. Ensure columns are framed to provide full end bearing (*IBC* Section 2304.9.7). This also includes proper blocking within floor truss cavities as detailed in standard truss installation details available from SBCA.

A BMS has a unique opportunity to enhance building construction quality. The BMS and the people they employ have the knowledge, expertise, means, and methods to effectively communicate and facilitate proper truss installation. This relationship affords a BMS providing installed sales a proficiency not readily available to other contractors, which helps to ensure truss installation meets published standards and relevant building code sections. Additionally, their relationship with suppliers and/or "in-house" building component manufacturing facilities provides them the distinctive advantage of knowledge and expertise to ensure products sold are installed to meet related industry standards and manufacturer installation instructions. This includes all the work needed to achieve better than average building performance. **SBC**