

## Standard Responsibilities in the Design and Application of Metal Plate Connected Wood Trusses

August 2014

### PREAMBLE

ANSI/TPI 1 National Design Standard for Metal Plate Connected Wood Truss Construction is the industry's consensus standard and is referenced by the IBC and IRC. The following text is a compilation of the requirements provided in ANSI/TPI 1-2014, Chapter 2, with permission from the publisher, the Truss Plate Institute (TPI), [tpinst.org](http://tpinst.org). This document also incorporates industry policy language found at [sbcindustry.com/design-responsibilities](http://sbcindustry.com/design-responsibilities). Where the Legal Requirements mandate a Registered Design Professional (RDP) for buildings, the Building Designer and the Truss Designer shall be Registered Design Professionals. Terms that are capitalized are in ANSI/TPI 1 and in BCSI, Guide to Good Practice for Handling, Installing, Restraining & Bracing of Metal Plate Connected Wood Trusses.

### 1.0 GENERAL PURPOSES

The purpose of ANSI/TPI 1, Chapter 2, is to define and draw attention to the responsibilities of the Owner, Building Designer, Contractor, Truss Manufacturer, and Truss Designer (also known as the Truss Design Engineer), with respect to the application of Trusses in the construction of a Building.

### 2.0 REQUIREMENTS OF THE OWNER

**2.1 Building Permit.** Where required by Legal Requirements, including the Building Code, the Owner shall obtain a Building Permit.

If special inspections or structural observations related to Trusses are required as part of the Construction Documents and/or permitting process, these requirements shall be communicated in writing to the Contractor or Truss Manufacturer as appropriate.

**2.2 RDP Designation.** The Owner shall engage and designate on the Building Permit application the RDP for the Building, if the Building Designer is required to be a RDP.

**2.3 Engagement with the Building Designer.** The Owner shall engage a Building Designer to prepare the Construction Documents and review the Truss Submittal Package.

The Truss Manufacturer and Truss Designer shall be notified in writing by either the Owner or Contractor if the Building Designer is changed or is unable to continue to perform their duties.

In the absence of an independent Building Designer, the Owner shall assume the role of Building Designer.

**2.4 Engagement with the Contractor.** The Owner shall engage a Contractor to store, handle and install the Trusses for the Building, in compliance with any and all Legal Requirements.

**2.5 Review and Coordinate Submittal Packages.** The Owner or Owner's representative shall be responsible for ensuring that the requirements of Section 5.2 are accomplished.

### 2.6 Long Span Truss Requirements.

**2.6.1 Restraint/Bracing Design.** In all cases where a Truss clear span is 60 ft. (18 m) or greater, the Owner shall contract with any RDP for the design of the Temporary Installation Restraint/Bracing and the Permanent Individual Truss Member Restraint and Diagonal Bracing.

**2.6.2 Special Inspection.** In all cases where a Truss clear span is 60 ft. (18 m) or greater, the Owner shall contract with a Special Inspector to perform special inspections. Special Inspections shall assure that the Trusses, including the Temporary Installation Restraint/Bracing and the Permanent Individual Truss Member Restraint and Diagonal Bracing are installed in accordance with the approved Construction Documents and the approved Truss Submittal Package.

**2.7 Responsibility Exemptions.** The Owner is responsible for items listed in Section 2.0, and is not responsible for the requirements of other parties specified outside of Section 2.0.

### 3.0 REQUIREMENTS OF THE BUILDING DESIGNER

**3.1 Construction Documents.** The Construction Documents shall be prepared by the Building Designer and shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in detail that such documents conform to the Legal Requirements, including the Building Code.

**3.2 Deferred Submittals.** The Building Designer shall list the Deferred Submittals on the Construction Documents. The Building Designer shall review Deferred Submittals in accordance with Section 3.3.

**3.3 Review Submittal Packages.** The Building Designer shall review the Truss Submittal Package and is responsible for and shall coordinate and review each of the truss design drawings and all notes for compatibility with the construction documents, specifications, written requirements, design loads and load path with respect to the Building design. All such submittals shall include a notation indicating that they have been reviewed and whether or not they have been found to be in general conformance with the design of the Building. The Building Designer is engaged by the Owner to review and coordinate certain aspects of the project for compatibility with the design of the Building or structure, including submittal documents prepared by others, deferred submittal documents and phased submittal documents.

**3.4 Required Information in the Construction Documents.** The Building Designer, through the Construction Documents, shall provide information sufficiently accurate and reliable to be used for facilitating the supply of

the Structural Elements and other information for developing the design of the Trusses for the Building, and shall provide the following:

- (a) All Truss and Structural Element orientations and locations.
- (b) Information to fully determine all Truss profiles.
- (c) All Structural Element and Truss support locations and bearing conditions (including the allowable bearing stress).
- (d) The location, direction, and magnitude of all dead, live, and lateral loads applicable to each Truss including, but not limited to, loads attributable to: roof, floor, partition, mechanical, fire sprinkler, attic storage, rain and ponding, wind, snow (including snow drift and unbalanced snow), seismic; and any other loads on the Truss.
- (e) All anchorage designs and connections to the Structural Elements and the Permanent Building Stability Bracing required to resist uplift, gravity, and lateral loads.
- (f) Truss-to-Structural Element connections, but not Truss-to-Truss connections.
- (g) Criteria related to serviceability issues including:
  - (1) Allowable vertical, horizontal or other required deflection criteria.
  - (2) Any dead load, live load, and in-service creep deflection criteria for flat roofs subject to ponding loads.
  - (3) Any Truss camber requirements.
  - (4) Any differential deflection criteria from Truss-to-Truss or Truss-to- adjacent Structural Element.
  - (5) Any deflection and vibration criteria for floor Trusses including:
    - (i) Any strongback bridging requirements.
    - (ii) Any dead load, live load, and in-service creep deflection criteria for floor trusses supporting stone or ceramic tile finishes.
  - (6) Moisture, temperature, corrosive chemicals and gases expected to result in:
    - (i) Wood moisture content exceeding 19 percent,
    - (ii) Sustained temperatures exceeding 150°F, and/or
    - (iii) Corrosion potential from wood preservatives or other sources that may be detrimental to Trusses.

**3.5 Responsibility Exemptions.** The Building Designer is responsible for items listed in Section 3.0, and is not responsible for the requirements of other parties specified outside of Section 3.0.

#### **4.0 REQUIREMENTS FOR THE PERMANENT MEMBER RESTRAINT/ BRACING OF TRUSS SYSTEMS**

**4.1 Method of Restraint.** The method of Permanent Individual Truss Member Restraint/Bracing and the method of anchoring or restraining to prevent lateral movement of all Truss members acting together as a system shall be accomplished by:

**4.1.1 Standard Industry Details.** Standard industry Lateral Restraint and Diagonal Bracing details in accordance with BCSI-B3: Permanent Restraint/Bracing of Chords and Web Members and/or BCSI-B7: Temporary & Permanent Restraint/Bracing for Parallel Chord Trusses.

**4.1.2 Substitution with Reinforcement.** Permanent Individual Truss Member Restraint shall be permitted to be replaced with reinforcement designed to prevent buckling (e.g., buckling reinforcement by T-reinforcement or L-reinforcement, proprietary reinforcement, etc.).

**4.1.3 Project Specific Design.** A project specific Truss member permanent Lateral Restraint/Diagonal Bracing design for the roof or floor Building Structural System shall be permitted to be specified by the Building Designer or any RDP.

**4.2 Absence of Truss Restraint/Bracing Method or Details.** If a specific Truss member permanent restraint/bracing design for the roof or floor Building Structural System is not provided by the Owner, Building Designer or any RDP, the method of Permanent Individual Truss Member Restraint and Diagonal Bracing for the Truss Top Chord, Bottom Chord, and Web members shall be in accordance with BCSI-B3 or BCSI-B7.

**4.3 Trusses Spanning 60 Feet (18 m) or Greater.** For Trusses with clear spans 60 ft. (18 m) or greater, see Section 2.6.

#### **5.0 REQUIREMENTS OF THE CONTRACTOR**

##### **5.1 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.

##### **5.2 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.

**5.3 Truss Submittal Package Review.** The Contractor shall not proceed with the Truss installation until the Truss Submittal Package has been reviewed by the RDP/Building Designer.

**5.4 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.

**5.5 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 2.6.

**5.6 Pre- and Post-Installation Check.** The Contractor shall examine the Trusses delivered to the job site and 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 may impair the structural integrity of the Truss.

**5.7 Truss Damage Discovery.** In the event that damage to a Truss is discovered that would likely impair the structural integrity of the Truss, 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 5.8.

**5.8 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 RDP.

**5.9 Responsibility Exemptions.** The Contractor is responsible for items listed in Section 5.0, and is not responsible for the requirements of other parties specified outside of Section 5.0.

## 6.0 REQUIREMENTS OF THE TRUSS DESIGNER (ALSO KNOWN AS THE TRUSS DESIGN ENGINEER)

**6.1 Preparation of Truss Design Drawings.** The Truss Designer is responsible for the preparation of the Truss Design Drawings based on the Truss design criteria and requirements set forth in the Construction Documents or as otherwise set forth in writing by the Building Designer as supplied to the Truss Designer by the Contractor through the Truss Manufacturer.

**6.2 Single Truss Component Design.** The Truss Designer shall be responsible for the design, in accordance with ANSI/TPI 1, of each singular Truss depicted on each Truss Design Drawing.

**6.3 Truss Design Drawing Seal and Signature.** When the Legal Requirements mandate a RDP for buildings, each individual Truss Design Drawing shall bear the seal and signature of the Truss Designer.

**Exception:** When a Cover/Truss Index Sheet is used, it is the only document required to be signed and sealed by the Truss Designer.

**6.4 Truss Placement Diagram.** When the Truss Placement Diagram serves only as a guide for Truss installation, it does not require the seal of the Truss Designer. Truss Placement Diagrams are typically NOT prepared by engineers, hence no RDP's seal can be applied pursuant to state professional engineering laws generally.

**6.5 Information on Truss Design Drawings.** Truss Design Drawings shall include, at a minimum, the information specified below:

- (a) Building Code used for design, unless specified on Cover/Truss Index Sheet.
- (b) Slope or depth, span and spacing.
- (c) Location of all joints and support locations.
- (d) Number of plies if greater than one.
- (e) Required bearing widths.
- (f) Design loads as applicable, including:
  - (1) Top Chord live load (for roof Trusses, this shall be the controlling case of live, snow, or rain load);
  - (2) Top Chord dead load;
  - (3) Bottom Chord live load;
  - (4) Bottom Chord dead load;
  - (5) Additional loads and locations;
  - (6) Environmental load design criteria (wind speed, snow, seismic, and all applicable factors as required to calculate the Truss loads); and
  - (7) Other lateral loads, including drag strut loads.

- (g) Adjustments to Wood Member and Metal Connector Plate design values for conditions of use.
- (h) Maximum reaction force and direction, including maximum uplift reaction forces where applicable.
- (i) Metal Connector Plate type, manufacturer, size, and thickness or gauge, and the dimensioned location of each Metal Connector Plate except where symmetrically located relative to the joint interface.
- (j) Size, species and grade for each Wood Member.
- (k) Truss-to-Truss connection and Truss field assembly requirements.
- (l) Calculated span to deflection ratio and/or maximum vertical and horizontal deflection for live load and for live plus dead load and KCR as applicable.
- (m) Maximum axial tension and compression forces in the Truss members.
- (n) Fabrication tolerance.
- (o) Required Permanent Individual Truss Member Restraint location.
- (p) Truss Designer.

**6.5.1 Raw Material Design Values.** Each Truss Design Drawing uses Metal Connector Plate design values published by Metal Connector Plate manufacturers and lumber industry published design values (mechanically or visually graded as indicated). These are incorporated into lumber design provisions and equations created by the American Wood Council (AWC) per the National Design Specification® (NDS®) for Wood Construction and input into modeling and analysis software that uses ANSI/TPI 1 provisions. The lumber design values correspond to the lumber size and grade as defined on the Truss Design Drawing incorporating the design values from the grade stamp identified by the Truss Manufacturer on the lumber prior to cross cutting for manufacturing purposes. The published lumber design values (a) are calculated and administered by the lumber rules writing agencies using a property range or bending correlation and are not tension proof tested, (b) are approved by the American Lumber Standards Committee (ALSC) as published design data that are representative of the strength and stiffness of specific grades and species/species groups of lumber, and (c) are further known by ALSC and the lumber rules writing agencies as individual visually or mechanically graded lumber pieces which do not have precise design values.

Neither the Truss Manufacturer nor the Truss Designer can therefore verify or warrant that published lumber design values will exist within the lumber utilized in the Truss when manufactured and delivered.

**6.6 Sealing by a Truss Design Engineer.** The seal of the Truss Design Engineer (also referred in some Jurisdictions as a "Delegated or Specialty Engineer") on any Truss Design Drawing represents an acceptance of professional engineering responsibility for the design of the single Truss. The Truss Design Engineer is neither the Building Designer nor the Truss System Engineer (as the term is defined in some Jurisdictions), nor the Structural Engineer of Record for any Building.

**6.7 Responsibility Exemptions.** The Truss Designer is responsible for items listed in Section 6.0, and is not responsible for the requirements of other parties specified outside of Section 6.0.

## 7.0 REQUIREMENTS OF THE TRUSS MANUFACTURER

**7.1 Truss Design Criteria and Requirements.** The Truss Manufacturer shall obtain the Truss design criteria and requirements from the Construction Documents.

**7.2 Communication to Truss Designer.** The Truss Manufacturer shall communicate the Truss design criteria and requirements to the Truss Designer.

**7.3 Alternate Truss Designs.** If an alternative or partial set of Truss design(s) is proposed by either the Truss Manufacturer or the Truss Designer, such alternative set of design(s) shall be sent to and reviewed by the Building Designer prior to manufacturing. Where the Legal Requirements mandate a RDP for buildings, these alternative set of design(s) do not require the seal of the Truss Designer until accepted by the Building Designer, whereupon these alternative Truss Design Drawings shall be sealed by the Truss Designer.

**7.4 Truss Placement Diagram.** Where required by the Construction Documents or Contract, the Truss Manufacturer shall prepare the Truss Placement Diagram that identifies the assumed location for each individually designated Truss and references the corresponding Truss Design Drawing. The Truss Placement Diagram shall be permitted to include identifying marks for other products including Structural Elements, so that they may be more easily identified by the Contractor during field erection. When the Truss Placement Diagram serves only as a guide for Truss installation and requires no engineering input or is not prepared by an RDP, it does not require the seal of any RDP including cases where the Legal Requirements mandate a RDP for the Building.

**7.5 Required Documents.** The Truss Manufacturer shall supply to the Contractor the Truss Submittal Package, including the Truss Design Drawings, a Truss Placement Diagram, if required by the Construction Documents or Contract, and the required Permanent Individual Truss Member Restraint and the method to be used per Section 4.0.

**7.6 Special Application Conditions.** The Truss Manufacturer shall be allowed to provide detail drawings, serves only as a guide for Truss installation, to the Contractor to document special application conditions.

**7.7 Truss Submittal Packages.** Where required by the Construction Documents or Contract, Legal Requirements or the Building Official, the Truss Manufacturer shall provide the appropriate Truss Submittal Package to one or more of the following: Building Official; RDP/Building Designer and/or Contractor for review and/or approval per Section 5.2.

**7.8 Reliance on Construction Documents.** The Truss Manufacturer shall be permitted to rely on the accuracy and completeness of information furnished in the Construction Documents or otherwise furnished in writing by the Building Designer and/or Contractor.

**7.9 Fabrication Tolerance.** The Truss Manufacturer shall determine the value for the fabrication tolerance to be used in the design of the Trusses.

**7.10 Manufacturer Quality Criteria.** The Truss Manufacturer shall manufacture the Trusses in accordance with the final Truss Design Drawings, using the quality criteria required by ANSI/TPI 1 unless more stringent quality criteria is provided by the Owner in writing or through the Construction Documents.

**7.11 In-Plant Truss Inspections.** Truss inspections, as required by the Jurisdiction, shall be performed at the manufacturer's facility using the manufacturer's In-Plant Quality Assurance Program monitored by an inspection agency approved by the Jurisdiction, and shall satisfy any quality control/quality assurance requirements for the Trusses, and shall satisfy any designated in-plant special inspection requirements for the Trusses.

**7.12 Responsibility Exemptions.** The Truss Manufacturer is responsible for items listed in Section 7.0, and is not responsible for the requirements of other parties specified outside of Section 7.0.

## 8.0 CONTRACTS

**8.1 Defer to Construction Documents.** ANSI/TPI 1, Chapter 2, is not intended to take precedence over the Construction Documents, where a Contract between parties incorporates by reference the Construction Documents, and therefore the Construction Documents shall apply as between the parties to the Contract.

**8.2 Defer to Contract.** ANSI/TPI 1, Chapter 2, is not intended to take precedence over a Contract as a Contract shall be permitted to contain provisions that take precedence over ANSI/TPI 1, Chapter 2, and/or the Construction Documents. A party shall not exclude in a Contract a responsibility established by ANSI/TPI 1, Chapter 2, or the Construction Documents unless that responsibility is assigned to a qualified party and that party agrees to that assignment.

Any changes made to the Construction Documents by contract shall be submitted, reviewed and approved by the Building Official.

**8.3 Incorporation into Contract.** A Contract shall be permitted to incorporate ANSI/TPI 1, Chapter 2, to establish the responsibilities of the parties to such Contract.

**DEFINITIONS OF TERMS ARE AVAILABLE IN ANSI/TPI 1 AND BCSI.**

These recommendations should not be interpreted as superior to the project Architect's or Engineer's design specification for handling, installing, restraining and bracing metal plate connected wood trusses for a particular roof or floor.



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