

Design Responsibilities for Commercial Construction Projects in the State of Missouri

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Issue:

Questions frequently arise as to who is responsible for which portions of the design process in a commercial construction project. Then people ask for guidance pertaining to their roles and responsibilities with respect to the Legal Requirements (which are the building code and prevailing professional engineering law).

Background:

WTCA has developed this *Technical Note* to clearly outline a component manufacturer's role and responsibility for commercial construction in the context of the building code and professional engineering law applicable in the State of Missouri. This *Technical Note* is based on conversations with and questions from various Missouri local building officials and registered design professionals. The Missouri engineering law and the 2003 International Building Code (IBC), which most counties in Missouri have adopted, form the basis for the analysis. *Appendix A* defines key terminology used in this article.

Analysis:

Where a Registered Design Professional is Required

According to the Missouri Revised Statutes, (MRS) Section 327.101 (*see Appendix B*), a Registered Design Professional (also known as Licensed Design Professional or Licensed Engineer) is required on all projects except the following:

- (a) A dwelling house; or
- (b) A multiple family dwelling house, flat or apartment containing not more than two families; or
- (c) A commercial or industrial building or structure which provides for the employment, assembly, housing, sleeping or eating of not more than nine persons; or
- (d) Any one structure containing less than twenty thousand cubic feet, except as provided in (b) and (c) above, and which is not a part or a portion of a project which contains more than one structure; or
- (e) A building or structure used exclusively for farm purposes.

Building Designer

For commercial construction projects in the State of Missouri, the "Building Designer" as used in this *Technical Note* is the Registered Design Professional who has responsibility for the overall Building design in accordance with the state's statutes and regulations governing the professional registration and certification of Architects or Engineers (*see Appendix A for complete definition*). According to Section 106.1 (*see Appendix C for complete text*) of the 2003 IBC the Construction Documents shall be prepared as follows:



Prepared with assistance from Missouri Truss Fabricators Association, a local chapter of SBCA.

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2003 IBC 106.1 Submittal documents. ...The construction documents shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed. ...

The Construction Documents should clearly define the scope of the project as follows:

2003 IBC 106.1.1 Information on construction documents. Construction documents shall be dimensioned and drawn upon suitable material... Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed...

The Structural Design Documents (*as defined in Appendix A*) are to be included within the Construction Documents.

The Building Designer, who under Missouri law for commercial construction projects is a Registered Design Professional, is also the person who reviews and coordinates all the Construction Documents prepared by others to make sure they do not conflict with the scope of the project, the specifics of which are listed in IBC Section 106.3.4.1 (*see Appendix C*).

2003 IBC 106.3.4.1 General. ...The registered design professional in responsible charge shall be responsible for reviewing and coordinating submittal documents prepared by others, including phased and deferred submittal items, for compatibility with the design of the building. ...

On typical commercial construction projects, plans for fire alarm systems, manufactured trusses and sprinkler systems may not be completed at the time that the Construction Documents are submitted for approval. These become known as "deferred submittals" and the Building Designer is responsible for reviewing these for general conformance to the design of the Building. This process is defined in IBC Section 106.3.4.2 (*see Appendix C*).

2003 IBC 106.3.4.2 Deferred submittals. ... Documents for deferred submittal items shall be submitted to the registered design professional in responsible charge who shall review them and forward them to the building official with a notation indicating that the deferred submittal documents have been reviewed and been found to be in general conformance to the design of the building.

There are no requirements of either the IBC or Missouri law which would provide that for those products handled on a deferred submittal basis, the design responsibilities of the parties involved would in any way change.

In preparing the Structural Design Documents, the Building Designer needs to provide the Truss Designer with the information necessary to properly design the Structural Building Components for the Building. According to ANSI/TPI 1-2002 (TPI 1) Chapter 2 (*see Appendix D for complete text*), which is adopted by reference in the IBC Sections 102.4 and 2303.4, and Chapter 35 "Reference Standards" provisions (*see Appendix C*), the following information should be provided:

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

- 2.5.2.1 All Structural Element and Truss orientations and locations;
- 2.5.2.2 Information to fully determine all Truss profiles;
- 2.5.2.3 All Structural Element and Truss bearing conditions;
- 2.5.2.4 The location, direction, and magnitude of all dead and live loads applicable to each Structural Element and Truss...
- 2.5.2.5 All Structural Element and Truss anchorage designs required to resist uplift, gravity, and lateral loads;
- 2.5.2.6 Allowable vertical and horizontal deflection criteria and any specific criteria...
- 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...and permanent bracing for all Structural Elements and Trusses...
- 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.

The Truss Manufacturer and Truss Designer must rely on the Building Designer to take the information provided by the Truss Design Drawing, the *Building Component Safety Information* (BCSI 1-03), and the Building Designer's analysis of the flow of loads through the Building to design a Permanent Bracing system that takes the resisted Truss member buckling loads (if any) and tie these loads off to the Building's load path system as follows (*see Appendix D*):

ANSI/TPI 1-2002 Section 2.6.6 ... The approximate location for, or the maximum spacing between, permanent lateral bracing of Truss members will be indicated on the Truss Design and it shall be the responsibility of the Owner to engage the Building Designer or others to specify how the permanent lateral bracing is to be anchored or restrained to prevent lateral movement of all Truss members together. ...

The Building Designer is the professional who is most intimately familiar with the flow of loads through the entire Building and is the one who can use this knowledge to ensure bracing load transfer and overall Building performance success.

Truss Designer

The Building Designer typically delegates the design of all the individual trusses to the Truss Designer. The Truss Designer's responsibility is to properly design the trusses according to the information provided in the Structural Design Documents. The Truss Designer is responsible for the final designed Truss detailed in a Truss Design Drawing. Section 2303.4.1 of the 2003 IBC (*see Appendix C*), outlines the exact information that needs to be on a Truss Design Drawing:

2003 IBC 2303.4.1 Truss design drawings. These shall include, at a minimum:

1. Slope or depth, span and spacing;
2. Location of all joints;
3. Required bearing widths;
4. Design loads as applicable;
5. Top chord live load (including snow loads);
6. Top chord dead load;
7. Bottom chord live load;
8. Bottom chord dead load;
9. Concentrated loads and their points of application;
10. Controlling wind and earthquake loads;
11. Adjustments to lumber and metal connector plate design value for conditions of use;
12. Each reaction force and direction;
13. Metal connector plate type, size, thickness or gage, and the dimensioned location of each metal connector plate except where symmetrically located relative to the joint interface;
14. Lumber size, species and grade for each member;
15. Connection requirements for:
 - 15.1 Truss to truss girder;
 - 15.2 Truss ply to ply;
 - 15.3 Field splices;
16. Calculated deflection ratio or maximum description for live and total load;
17. Maximum axial compression forces in the truss members to design the size, connections and anchorage of the permanent continuous lateral bracing. Forces shall be shown on the truss construction documents or on supplemental documents; and
18. Required permanent truss member bracing location. bracing location.

Note: The stability of each individual Truss and how that is achieved is the responsibility of the Truss Designer, as the Truss Designer is most intimately familiar with the configuration and flow of loads through each individual Truss and is the one who can use this knowledge to ensure proper bracing locations and Truss stability. To aid in the design of the Permanent Bracing of the roof or floor truss system, the Truss Design Drawing includes items 17 and 18 above.

In the 2006 IBC, clarification was made to help with the implementation of item 18 (*see Appendix E*) as follows:

2006 IBC 2303.4.1 Truss design drawings. These shall include, at a minimum: ...18. Required permanent individual truss member bracing and method per Section 2303.4.1.5, unless a specific truss member permanent bracing plan for the roof or floor structural system is provided by a registered design professional.

2006 IBC 2303.4.1.5 Truss member permanent bracing. Where permanent bracing of truss members is required on the truss design drawings, it shall be accomplished by one of the following methods:

1. The trusses shall be designed so that the buckling of any individual truss member can be resisted internally by the structure (e.g., buckling member T-bracing, L-bracing, etc.) of the individual truss. The truss individual member buckling reinforcement shall be installed as shown on the truss design drawing or on supplemental truss member buckling reinforcement diagrams provided by the truss designer.
2. Permanent bracing shall be installed using standard industry bracing details that conform with generally accepted engineering practice. Individual truss member continuous lateral bracing location(s) shall be shown on the truss design drawing.

As noted above, the Building Designer is responsible for integrating the flow of all loads through the overall design of the Building. The Permanent Bracing of the roof and floor Truss system design is an integral part of the design process [IBC 2303.4.1(17) and (18)].

The proposed 2009 International Building Code language provides the following enhancement to the 2006 IBC language listed above:

Proposed 2009 IBC 2303.4.1.2 Truss member permanent bracing. ...In the absence of specific bracing requirements, trusses shall be braced in accordance with the Building Component Safety Information (BCSI 1) Guide to Good Practice for Handling, Installing & Bracing of Metal Plate Connected Wood Trusses.)

Basically, the Truss Designer needs to provide everything that is pertinent to the design of the individual component. The Building Designer needs to review the Truss Design Drawing submittals to verify that all the Structural Building Components and their placement comply with the Structural Design Documents.

In other words, the Truss Designer has undertaken truss design work based on the specific information provided in the Structural Design Documents. Since the design work that is contracted for is specific to the trusses, the scope of responsibility for the Truss Designer is limited to the Truss Design Drawings created from the information on the Structural Design Documents. In all cases, when a seal is required, the Truss Designer should clearly define what is meant by the seal (i.e., scope of engineering work). MRS Section 327.411.1(3) (*see Appendix B*) states:

MRS 327.411. ...3. Any architect, professional engineer, professional land surveyor, or landscape architect may, but is not required to, attach a statement over his or her signature, authenticated by his or her personal seal, specifying the particular plans, specifications, plats, reports, surveys or other documents or instruments, or portions thereof, intended to be authenticated by the seal, and disclaiming any responsibility for all other plans, specifications, estimates, reports, or other documents or instruments relating to or intended to be used for any part or parts of the architectural or engineering project or survey or landscape architectural project.

Truss Manufacturer

The Truss Manufacturer's primary responsibility is to manufacture the trusses in conformance with TPI 1. TPI 1 provides manufacturing quality requirements to ensure the trusses perform as anticipated by the approved Truss Design Drawings. Many Truss Manufacturers also contract with an approved third party inspection agency to perform unannounced, periodic audits of the manufacturing facility to facilitate compliance with the building code framing inspection requirements as follows (*see Appendix C*):

2003 IBC 109.3 Required inspections. The building official, upon notification, shall make the inspections set forth in Sections 109.3.1 through 109.3.10...

2003 IBC 109.3.4 Frame inspection. Framing inspections shall be made after the roof deck or sheathing, all framing, fireblocking and bracing are in place and pipes, chimneys and vents to be concealed are complete and the rough electrical, plumbing, heating wires, pipes and ducts are approved.

2003 IBC 109.4 Inspection agencies. The building official is authorized to accept reports of approved inspection agencies, provided such agencies satisfy the requirements as to qualifications and reliability.

For more information on a specific truss industry quality control program please visit:
www.sbcindustry.com/wtcaqc.php.

Many Truss Manufacturers include important safety information, such as BCSI 1-03, (www.sbcindustry.com/bcsi.php) in their jobsite packages as a guide to aid the Contractor in the proper handling, installing, and bracing of metal plate connected wood trusses.

Contractor

The Contractor is responsible for the construction means, methods, techniques, sequences, procedures, programs and safety in connection with the handling, storing, installation and bracing of the trusses as defined in TPI 1 (*see Appendix D for complete text*) and adopted by reference in the IBC.

ANSI/TPI 1-2002 Section 2.6.2 ... The Contractor...shall determine the requirements of, and provide all materials for construction in accordance with the Structural Design Documents. These requirements and materials for construction shall include all necessary items for safe construction, including design and installation of adequate temporary bracing during construction for the Building Structural System.

Further, according to TPI 1, the Contractor is responsible for the inspection of trusses to ensure that they fit for the intended application as follows:

ANSI/TPI 1-2002 Section 2.6.3 The Contractor shall be responsible...to review or inspect Trusses delivered or to review and inspect Trusses after erection for any problems, including dislodged/missing connectors, cracked, dislodged or broken members, or any other damage that may impair the structural integrity of the Truss. In the event that damage to the Truss is discovered that would likely impair the structural integrity of the Truss, the Contractor shall be responsible to ensure that the Truss not be erected and 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 such field repairs have been properly completed. In the event of such damage and unless otherwise specified by Contract, the Contractor shall contact the appropriate design professional to determine an adequate field repair and the Contractor shall be responsible to construct any such field repair.

According to TPI 1, the Truss Manufacturer and Truss Designer must rely on the Contractor to install the trusses safely and professionally as follows:

ANSI/TPI 1-2002 Section 2.6.5 The Truss Manufacturer and Truss Designer are not responsible for, nor do the Truss Manufacturer and Truss Designer have control of, 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 Truss Manufacturer and Truss Designer are also not responsible for the failure 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.

According to TPI 1, the Truss Manufacturer and Truss Designer must rely on the Contractor to take the information provided by the Truss Design Drawing and then install all the Permanent Bracing necessary to keep Truss members from buckling out of plane and to integrate this with the building's load path system as specified by the Building Designer as follows:

ANSI/TPI 1-2002 Section 2.6.6 The Truss Manufacturer and Truss Designer shall not be responsible for the design, materials, or installation of permanent bracing for the Building, including bracing for all or any of the Trusses and Structural Elements. The approximate location for, or the maximum spacing between, permanent lateral bracing of Truss members [see *IBC 2006 2303.4.1(18) above and in Appendix E*] will be indicated on the Truss Design Drawing and it shall be the responsibility of the Owner to engage the Building Designer or others to specify how the permanent lateral bracing is to be anchored or restrained to prevent lateral movement of all Truss members together.

The Contractor is the construction professional that is most intimately familiar with the plans and specifications and how all the materials of construction must fit together to transfer all the loads through the entire Building to the foundation. This expertise is critical to overall Building performance success.

The final step in a construction project involving metal plate connected wood trusses is to have an installation inspection performed to verify that the application of all trusses are in accordance with the approved Structural Design Documents and the prevailing building code. This is typically performed by the Local Building Official per IBC Section 109.3 (*see Appendix C*).

Conclusion:

The Structural Building Component industry, including those involved in the design and manufacture of metal plate connected wood trusses, operates under the expectation that the Building Designer and the Contractor are professionals who are competent to undertake the work they have agreed to perform on any given project, in compliance with all the Legal Requirements of engineering law, the code, and the contracts that are entered into. If the foregoing defined responsibilities are followed closely, it has been the experience of our industry that all operations needed to implement the construction project run smoothly.

Appendix A¹

Definitions:

- a. **ANSI/TPI 1, American National Standard, *National Design Standard For Metal Plate Connected Wood Truss Construction***: Publication of the Truss Plate Institute (TPI) developed under the American National Standards Institute (ANSI) consensus process. Provides the analysis, design, and manufacturing criteria for the metal plate connected wood truss industry.
- b. **Architect**: Any licensed design professional practicing architecture who designs all or a part of the Building Structural System and/or who produces all or part of the Construction Documents and which may include all or part of the Structural Design Documents.
- c. **Bottom Chord**: Inclined (e.g., scissors truss) or horizontal member that establishes the bottom of a truss, usually carrying combined tension and bending stresses.
- d. **Building**: Any structure used or intended for supporting or sheltering any use or occupancy.
- e. **Building Component Safety Information (BCSI 1-03), *Guide to Good Practice For Handling, Installing & Bracing of Metal Plate Connected Wood Trusses***: A booklet produced for the truss industry by the Truss Plate Institute (TPI) and WTCA to provide a guide for jobsite safety and truss performance.
- f. **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.
- g. **Building Designer (See also Registered Design Professional)**: Individual or organization having responsibility for the overall building or structure design in accordance with the state's statutes and regulations governing the professional registration and certification of architects or engineers. This responsibility includes but is not limited to foundation design, structural member sizing, load transfer, bearing conditions, and the structure's compliance with the applicable building codes. Also referred to as registered architect or engineer, Building Designer, and registered Building Designer.
- h. **Construction Documents**: Written, graphic and pictorial documents, including the Structural Design Documents, prepared or assembled for describing the design, location and physical characteristics of the elements of a project necessary for obtaining a permit and constructing a building.
- i. **Contract**: A legally recognized document between two or more parties that includes the agreement between the Truss Manufacturer and its customer which sets forth the terms and conditions and scope of responsibilities applicable to the Truss Manufacturer.
- j. **Contractor**: The Owner of the Building or the individual or organization who contracts with the Owner and is responsible for the construction of the Building Structural System in accordance with all Legal Requirements. The term "Contractor" shall include those subcontractors who have a direct contract with the Contractor to perform all or a portion of the storage, handling, installation, and bracing (temporary and permanent) of the Trusses.
- k. **Conventional Light-frame Wood Construction**: A type of construction whose primary structural elements are formed by a system of repetitive wood-framing members. This includes wood Truss construction.
- l. **Cross Bracing**: Bracing installed in the web member plane of trusses to transfer lateral loads out of the truss system and up into the roof and down into the ceiling diaphragms.
- m. **Diagonal Bracing**: Used in conjunction with lateral bracing to transfer brace forces into the supporting structure. Diagonal braces are installed in the same plane as lateral bracing but at 45-degree angle to the lateral brace.
- n. **Engineer**: Any Licensed Design Professional practicing engineering who designs all or a part of the Building Structural System and/or who produces all or a part of the Structural Design Documents.
- o. **Gable End Frame**: A component manufactured to complete the end wall of a building. The bottom chord of the gable end frame is continuously supported by the end-bearing wall. Verticals between the top and bottom chords are typically spaced at 24" on center. The verticals function as load carrying members and as attachment members for sheathing or other end wall coverings. The gable end frame must be incorporated into the end shear wall by the Building Designer.
- p. **Hip Roof**: Roof system in which the slope of the roof at the end walls of the building is perpendicular to the slope of the roof along the sides of the building.
- q. **Jurisdiction**: The governmental unit that has adopted this standard under due legislative authority.

¹ Definitions taken from IBC 2003, ANSI/TPI 1-2002 Chapter 2, adopted by reference in IBC 2003 (See IBC 102.4, 2303.4, 2306.1, Chapter 35), or the *Metal Plate Connected Wood Truss Handbook* published by WTCA.

- r. Lateral Bracing (also Continuous Lateral Bracing):** Members installed at right angles to a chord or web member of a truss to provide stability to the truss.
- s. Legal Requirements:** Applicable provisions of all statutes, laws, rules, regulations, ordinances, codes, or orders of any governmental authority or Jurisdiction of the United States of America, any state, and any political subdivision or quasi-governmental authority or Jurisdiction of any of the same, including, but not limited to, departments, commissions, boards, bureaus, agencies, counties, municipalities, provinces, and other instrumentalities.
- t. Local Building Official:** The officer or other designated authority charged with the administration and enforcement of the applicable building code, or a duly authorized representative, who in accordance with the Legal Requirements may impose requirements on Truss Manufacturers and Truss Designers relating to the Trusses and the Truss Submittals.
- u. Permanent Bracing:** Bracing installed to provide support at right angles to the plane of the truss to hold it in its assumed design position. Permanent bracing stays in place for the life of the structure. The Building Designer may design the permanent bracing to resist lateral forces imposed on the completed building by wind load or seismic load.
- v. Piggy Back Truss:** Truss made in two pieces usually consisting of a hip type truss with a triangular cap fastened to it. Designed when shipping or manufacturing limitations are affected by overall truss height.
- w. Owner:** The individual or organization who owns the Building, and: (a) either designs and prepares, or retains the Building Designer to design and prepare, the Building's Structural System and the Structural Design Documents; and (b) either constructs, or retains the Contractor to construct, the Building's Structural System.
- x. Registered Design Professional (See also Building Designer):** An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the state or Jurisdiction in which the project is to be constructed.
- y. Span:** Horizontal distance between outside edges of exterior bearings.
- z. Structural Building Components:** Specialized structural building products designed, engineered and manufactured under controlled conditions for a specific application. They are incorporated into the overall building structural system by the Building Designer. Examples are wood or steel roof trusses, floor trusses, floor panels, wall panels, I-joists, or engineered beams and headers.
- aa. Structural Design Documents:** Written, graphic and pictorial architectural or structural documents, specifications and addenda prepared or assembled for the overall construction of the Building Structural System, which are part of the Construction Documents.
- bb. Structural Element:** A single joist, rafter, beam, or other structural member (not including the Trusses) designed by others and supplied for the Building Structural System by either the Truss Manufacturer or others.
- cc. Structural Element Submittals:** Documentation relating to the Structural Elements that are supplied by the Truss Manufacturer, if required by the Contract, to the Local Building Official, Owner, Building Designer and/or Contractor for their review and/or approval.
- dd. Temporary Bracing:** Bracing installed for the purpose of holding trusses true to line, dimension and plumb. In addition, temporary bracing holds trusses in a stable condition until permanent truss bracing and other permanent components that contribute to the overall rigidity of the roof or floor are in place. Temporary bracing may consist of ground bracing, continuous lateral sheets or ties, diagonals, cross bracing or similar items. See WTCA's BCSI 1-03 for more information.
- ee. Top Chord:** Inclined or horizontal member that establishes the top member of a truss.
- ff. Truss:** An individual metal plate connected wood component supplied for the Building Structural System.
- gg. Truss Designer:** The individual or organization responsible for the design of Trusses.
- hh. Truss Design Drawing:** The written, graphic and pictorial depiction of an individual Truss.
- ii. Truss Manufacturer:** An individual or organization engaged in the manufacturing of Trusses.
- jj. Truss Placement Diagram:** The illustration supplied by the Truss Manufacturer identifying the location assumed for each Truss, which references each individually designated Truss Design Drawing.
- kk. Truss Submittals:** The Truss Design Drawings, and the Truss Placement Diagram if required by the Contract, submitted by the Truss Manufacturer to the Local Building Official, Owner, Building Designer and/or Contractor for their review and/or approval.
- II. Web Member:** Members that join the top and bottom chords to form the triangular patterns typical of trusses. These members typically carry axial forces.

Appendix B

The language in RED signifies sections of the code or law that have been used in the foregoing document to make it easier for the reader to see the language in context.

Missouri Revised Statutes

Chapter 327 - Architects, Professional Engineers, Land Surveyors and Landscape

Unauthorized practice prohibited--persons excepted.

327.101. No person shall practice architecture in Missouri as defined in section 327.091 unless and until there is issued to the person a license or a certificate of authority certifying that the person has been duly licensed as an architect or authorized to practice architecture, in Missouri, and unless such license has been renewed as hereinafter specified; provided, however, that nothing in this chapter shall apply to the following persons:

- (1) Any person who is an employee of a person holding a currently valid license as an architect or who is an employee of any person holding a currently valid certificate of authority pursuant to this chapter, and who performs architectural work under the direction and continuing supervision of and is checked by one holding a currently valid license as an architect pursuant to this chapter;
- (2) Any person who is a regular full-time employee who performs architectural work for the person's employer if and only if all such work and service so performed is in connection with a facility owned or wholly operated by the employer and which is occupied by the employer of the employee performing such work or service, and if and only if such work and service so performed do not endanger the public health or safety;
- (3) Any holder of a currently valid license as a professional engineer who performs only such architectural work as is incidental and necessary to the completion of engineering work lawfully being performed by such licensed professional engineer;
- (4) Any person who is a landscape architect, city planner or regional planner who performs work consisting only of consultations concerning and preparation of master plans for parks, land areas or communities, or the preparation of plans for and the supervision of the planting and grading or the construction of walks and paving for parks or land areas and such other minor structural features as fences, steps, walls, small decorative pools and other construction not involving structural design or stability and which is usually and customarily included within the area of work of a landscape architect or planner;
- (5) Any person who renders architectural services in connection with the construction, remodeling or repairing of any privately owned building described in paragraphs (a), (b), (c), (d), and (e) which follow, and who indicates on any drawings, specifications, estimates, reports or other documents furnished in connection with such services that the person is not a licensed architect:
 - (a) A dwelling house; or
 - (b) A multiple family dwelling house, flat or apartment containing not more than two families; or
 - (c) A commercial or industrial building or structure which provides for the employment, assembly, housing, sleeping or eating of not more than nine persons; or
 - (d) Any one structure containing less than twenty thousand cubic feet, except as provided in (b) and (c) above, and which is not a part or a portion of a project which contains more than one structure;
 - or
 - (e) A building or structure used exclusively for farm purposes;
- (6) Any person who renders architectural services in connection with the remodeling or repairing of any privately owned building described in paragraphs (a), (c), (d) and (e) of subdivision (5) of this section or for a multiple family dwelling house, flat or apartment containing not more than four families, and who indicates on any drawings, specifications, estimates, reports or other documents furnished in connection with such services that the person is not a licensed architect;

(7) Any person or corporation who is offering, but not performing or rendering, architectural services if the person or corporation is licensed to practice architecture in the state or country of residence or principal place of business.

Missouri Revised Statutes

Chapter 327 - Architects, Professional Engineers, Land Surveyors and Landscape

Personal seal, how used, effect of.

327.411. 1. Each architect and each professional engineer and each professional land surveyor and each landscape architect shall have a personal seal in a form prescribed by the board, and he or she shall affix the seal to all final documents including, but not limited to, plans, specifications, estimates, plats, reports, surveys, proposals and other documents or instruments prepared by the licensee, or under such licensee's immediate personal supervision, and such licensee shall be held personally responsible for the contents of all such documents sealed by such licensee.

2. The personal seal of an architect or professional engineer or professional land surveyor or landscape architect shall be the legal equivalent of the licensee's signature whenever and wherever used, and the owner of the seal shall be responsible for the architectural, engineering, surveying, or landscape architectural documents, as the case may be, when the licensee places his or her personal seal on such plans, specifications, estimates, plats, reports, surveys or other documents or instruments for, or to be used in connection with, any architectural or engineering project, survey, or landscape architectural project.

3. Any architect, professional engineer, professional land surveyor, or landscape architect may, but is not required to, attach a statement over his or her signature, authenticated by his or her personal seal, specifying the particular plans, specifications, plats, reports, surveys or other documents or instruments, or portions thereof, intended to be authenticated by the seal, and disclaiming any responsibility for all other plans, specifications, estimates, reports, or other documents or instruments relating to or intended to be used for any part or parts of the architectural or engineering project or survey or landscape architectural project.

4. Nothing in this section, or any rule or regulation of the board shall require any professional to seal preliminary or incomplete documents.

Appendix C

2003 International Building Code Chapter 1 ADMINISTRATION SECTION 102: APPLICABILITY

IBC 102.4 Referenced codes and standards. The codes and standards referenced in this code shall be considered part of the requirements of this code to the prescribed extent of each such reference. Where differences occur between provisions of this code and referenced codes and standards, the provisions of this code shall apply.

International Building Code Chapter 1 ADMINISTRATION SECTION 106: CONSTRUCTION DOCUMENTS

IBC 106.1 Submittal documents. Construction documents, special inspection and structural observation programs, and other data shall be submitted in one or more sets with each application for a permit. The construction documents shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed. Where special conditions exist, the building official is authorized to require additional construction documents to be prepared by a registered design professional.

IBC 106.1.1 Information on construction documents. Construction documents shall be dimensioned and drawn upon suitable material. Electronic media documents are permitted to be submitted when approved by the building official. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that it will conform to the provisions of this code and relevant laws, ordinances, rules and regulations, as determined by the building official.

2003 International Building Code Chapter 1 ADMINISTRATION SECTION 106: CONSTRUCTION DOCUMENTS

IBC 106.3.4 Design professional in responsible charge.

106.3.4.1 General. When it is required that documents be prepared by a registered design professional, the building official shall be authorized to require the owner to engage and designate on the building permit application a registered design professional who shall act as the registered design professional in responsible charge. If the circumstances require, the owner shall designate a substitute registered design professional in responsible charge who shall perform the duties required of the original registered design professional in responsible charge. The building official shall be notified in writing by the owner if the registered design professional in responsible charge is changed or is unable to continue to perform the duties. The registered design professional in responsible charge shall be responsible for reviewing and coordinating submittal documents prepared by others, including phased and deferred submittal items, for compatibility with the design of the building. Where structural observation is required by Section 1709, the inspection program shall name the individual or firms who are to perform structural observation and describe the stages of construction at which structural observation is to occur (see also duties specified in Section 1704).

106.3.4.2 Deferred submittals. For the purposes of this section, deferred submittals are defined as those portions of the design that are not submitted at the time of the application and that are to be submitted to the building official within a specified period. Deferral of any submittal items shall have the prior approval of the building official. The registered design professional in responsible charge shall list the deferred submittals on the construction documents for review by the building official. Documents for deferred submittal items shall be submitted to the registered

design professional in responsible charge who shall review them and forward them to the building official with a notation indicating that the deferred submittal documents have been reviewed and been found to be in general conformance to the design of the building. The deferred submittal items shall not be installed until the design and submittal documents have been approved by the building official

2003 International Building Code
Chapter 1 ADMINISTRATION
SECTION 109: INSPECTIONS

109.3 Required inspections. The building official, upon notification, shall make the inspections set forth in Sections 109.3.1 through 109.3.10.

109.3.1 Footing and foundation inspection. ...

109.3.2 Concrete slab and under-floor inspection. ...

109.3.3 Lowest floor elevation. ...

109.3.4 Frame inspection. Framing inspections shall be made after the roof deck or sheathing, all framing, fireblocking and bracing are in place and pipes, chimneys and vents to be concealed are complete and the rough electrical, plumbing, heating wires, pipes and ducts are approved.

109.3.5 Lath and gypsum board inspection. ...

109.3.6 Fire-resistant penetrations. ...

109.3.7 Energy efficiency inspections. ...

109.3.8 Other inspections. ...

109.3.9 Special inspections. For special inspections, see Section 1704.

109.3.10 Final inspection. The final inspection shall be made after all work required by the building permit is completed.

109.4 Inspection agencies. The building official is authorized to accept reports of approved inspection agencies, provided such agencies satisfy the requirements as to qualifications and reliability.

109.5 Inspection requests. It shall be the duty of the holder of the building permit or their duly authorized agent to notify the building official when work is ready for inspection. It shall be the duty of the permit holder to provide access to and means for inspections of such work that are required by this code.

2003 International Building Code
Chapter 23 WOOD
SECTION 2303: MINIMUM STANDARDS AND QUALITY

2303.4 Trusses. Metal-plate-connected wood trusses shall be manufactured as required by TPI 1. Each manufacturer of trusses using metal plate connectors shall retain an approved agency to make unscheduled inspections of truss manufacturing and delivery operations. The inspection shall cover all phases of truss operations, including lumber storage, handling, cutting fixtures, passes or rollers, manufacturing, bundling and banding.

2303.4.1 Truss design drawings. Truss construction documents shall be prepared by a registered design professional and shall be provided to the building official and approved prior to installation. These construction documents shall include, at a minimum, the information specified below. Truss shop drawings shall be provided with the shipment of trusses delivered to the job site.

1. Slope or depth, span, and spacing;
2. Location of all joints;
3. Required bearing widths;
4. Design loads as applicable;
5. Top chord live load (including snow loads);
6. Top chord dead load;
7. Bottom chord live load;
8. Bottom chord dead load;
9. Concentrated loads and their points of application;
10. Controlling wind and earthquake loads;
11. Adjustments to lumber and joint connector design values for conditions of use;
12. Each reaction force and direction;
13. Metal connector plate type, size, thickness or gage, and the dimensioned location of each metal connector plate except where symmetrically located relative to the joint interface;
14. Lumber size, species and grade for each member;
15. Connection requirements for:
 - 15.1 Truss-to-truss girder;
 - 15.2 Truss ply-to-ply; and
 - 15.3 Field splices.
16. Calculated deflection ratio and/or maximum description for live and total load;
17. Maximum axial compression forces in the truss members to enable the building designer to design the size, connections and anchorage of the permanent continuous lateral bracing. Forces shall be shown on the truss drawing or on supplemental documents; and
18. Required permanent truss member bracing location.

2003 International Building Code
Chapter 35 REFERENCED STANDARDS

Standard reference number	Title	Referenced in code section number
TPI—2002	National Design Standards for Metal-Plate-Connected Wood Truss Construction	2303.4, 2306.1

Appendix D

ANSI/TPI 1-2002

National Design Standard for Metal Plate Connected Wood Truss Construction

Chapter 2 – Standard Responsibilities in the Design Process Involving Metal Plate Connected Wood Trusses

2.5 BUILDING STRUCTURAL SYSTEM DESIGN DOCUMENTS

- 2.5.1 The Building Designer, through the Structural Design Documents shall provide that the Structural Elements and Trusses shall not be subjected to adverse influences including, but not limited to moisture, temperature, and corrosive chemicals and gases. This provision shall specifically include notice for the Truss Designer of environments expected to result in wood moisture content exceeding 19 percent, and temperatures and/or corrosion potential that are unusually high relative to typical wood buildings.
- 2.5.2 The Building Designer, through the Structural Design Documents shall provide information sufficiently accurate and reliable to be used for facilitating the supply of the Structural Elements and for developing the design of the Trusses for the Building, and shall provide the following:
- 2.5.2.1 All Structural Element and Truss orientations and locations;
- 2.5.2.2 Information to fully determine all Truss profiles;
- 2.5.2.3 All Structural Element and Truss bearing conditions;
- 2.5.2.4 The location, direction, and magnitude of all dead and live loads applicable to each Structural Element and Truss including, but not limited to, loads attributable to: roof, floor, partition including any directions other than given in ANSI/TPI 1-2002, mechanical, fire sprinkler, attic, storage, rain loads and ponding, design wind speed and exposure category, snow, snow drift, unbalanced snow load, and seismic forces;
- 2.5.2.5 All Structural Element and Truss anchorage designs required to resist uplift, gravity, and lateral loads;
- 2.5.2.6 Allowable vertical and horizontal deflection criteria and any specific criteria per ANSI/TPI 1-2002;
- 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, including Truss to Structural Element connections, but not Truss to Truss girder connections except such connections that are excluded from the scope of the Truss Designer's responsibilities.
- 2.5.2.9 Permanent bracing design for the Building, including bracing to resist wind, seismic, or other lateral forces, and permanent bracing for all Structural Elements and Trusses. The permanent bracing design shall incorporate the continuous lateral chord and web member bracing that is designated on the individual Truss Design Drawings into the overall bracing for the entire Building Structural System.
- 2.5.3 The Building Designer shall be responsible for the adequacy of the design of the Building Structural System or the adequacy of the Structural Design Documents. The Building Designer shall evaluate the effect of the Trusses and the Structural Elements supplied, on the Building Structural System.

2.6 CONSTRUCTION RELATED ITEMS

- 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.
- 2.6.2 The Building Designer shall be responsible for determining appropriate field storage, handling, and installation measures for the Trusses and Structural Elements. The Contractor, unless otherwise specifically assigned by Contract, shall determine the requirements of, and provide all materials for construction in accordance with the Structural Design Documents. These requirements and materials for construction shall include all necessary items for safe construction, including design and installation of, adequate temporary bracing during construction for the Building Structural System.
- 2.6.3 The Contractor shall be responsible, unless otherwise assigned by Contract, to review or inspect Trusses delivered or to review and inspect Trusses after erection for any problems, including dislodged/missing connectors, cracked, dislodged or broken members, or any other damage that may impair the structural integrity of the Truss. In the event that damage to the Truss is discovered that would likely impair the structural integrity of the Truss, the Contractor shall be responsible to ensure that the Truss not be erected and 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 such field repairs have been properly completed. In the event of such damage and unless otherwise specified by Contract, the Contractor shall contact the appropriate design professional to determine an adequate field repair and the Contractor shall be responsible to construct any such field repair.
- 2.6.4 All Truss repairs shall be approved in writing by a Building Designer or a Truss Designer or other qualified person prior to the performance of the repair.
- 2.6.5 The Truss Manufacturer and Truss Designer are not responsible for, nor do the Truss Manufacturer and Truss Designer have control of, 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 Truss Manufacturer and Truss Designer are also not responsible for the failure 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.
- 2.6.6 The Truss Manufacturer and Truss Designer shall not be responsible for the design, materials, or installation of permanent bracing for the Building, including bracing for all or any of the Trusses and Structural Elements. The approximate location for, or the maximum spacing between, permanent lateral bracing of Truss members will be indicated on the Truss Design and it shall be the responsibility of the Owner to engage the Building Designer or others to specify how the permanent lateral bracing is to be anchored or restrained to prevent lateral movement of all Truss members together. Consideration shall be given to one of the following methods for providing this restraint or anchorage: (a) permanent diagonal bracing in the plane of the Truss members; or (b) other means when demonstrated by the Building Designer or other qualified person to provide equivalent lateral resistance.

Appendix E

2006 International Building Code Chapter 23 WOOD SECTION 2303: MINIMUM STANDARDS AND QUALITY

2303.4 Trusses.

2303.4.1 Design. Wood trusses shall be designed in accordance with the provisions of this code and accepted engineering practice. Members are permitted to be joined by nails, glue, bolts, timber connectors, metal connector plates or other approved framing devices.

2303.4.1.1 Truss designer. The individual or organization responsible for the design of trusses.

2303.4.1.2 Truss design drawings. The written, graphic and pictorial depiction of each individual truss shall be provided to the building official and approved prior to installation. Truss design drawings shall also be provided with the shipment of trusses delivered to the job site. Truss design drawings shall include, at a minimum, the information specified below:

1. Slope or depth, span and spacing;
2. Location of joints;
3. Required bearing widths;
4. Design loads as applicable;
5. Top chord live load (including snow loads);
6. Top chord dead load;
7. Bottom chord live load;
8. Bottom chord dead load;
9. Concentrated loads and their points of application as applicable;
10. Controlling wind and earthquake loads as applicable;
11. Adjustments to lumber and metal connector plate design value for conditions of use;
12. Each reaction force and direction;
13. Metal connector plate type, size, thickness or gage, and the dimensioned location of each metal connector plate except where symmetrically located relative to the joint interface;
14. Lumber size, species and grade for each member;
15. Connection requirements for:
 - 15.1. Truss to truss;
 - 15.2. Truss ply to ply; and
 - 15.3. Field splices.
16. Calculated deflection ratio and maximum vertical and horizontal deflection for live and total load as applicable;
17. Maximum axial tensile and compression forces in the truss members; and
18. Required permanent individual truss member bracing and method per Section 2303.4.1.5, unless a specific truss member permanent bracing plan for the roof or floor structural system is provided by a registered design professional.

Where required by one of the following, each individual truss design drawing shall bear the seal and signature of the truss designer:

1. Registered design professional; or
2. Building official; or
3. Statutes of the jurisdiction in which the project is to be constructed.

Exceptions:

1. When a cover sheet/truss index sheet combined into a single cover sheet is attached to the set of truss design drawings for the project, the single sheet/truss index sheet is the only document that needs to be signed and sealed within the truss submittal package.

2. When a cover sheet and a truss index sheet are separately provided and attached to the set of truss design drawings for the project, both the cover sheet and the truss index sheet are the only documents that need to be signed and sealed within the truss submittal package.

2303.4.1.3 Truss placement diagram. The truss manufacturer shall provide a truss placement diagram that identifies the proposed location for each individually designated truss and references the corresponding truss design drawing. The truss placement diagram shall be provided as part of the truss submittal package, and with the shipment of trusses delivered to the job site. Truss placement diagrams shall not be required to bear the seal or signature of the truss designer.

Exception: When the truss placement diagram is prepared under the direct supervision of a registered design professional, it is required to be signed and sealed.

2303.4.1.4 Truss submittal package. The truss submittal package shall consist of each individual truss design drawing, the truss placement diagram for the project, the truss member permanent bracing specification and, as applicable, the cover sheet/truss index sheet.

2303.4.1.5 Truss member permanent bracing. Where permanent bracing of truss members is required on the truss design drawings, it shall be accomplished by one of the following methods:

1. The trusses shall be designed so that the buckling of any individual truss member can be resisted internally by the structure (e.g. buckling member T-bracing, L-bracing, etc.) of the individual truss. The truss individual member buckling reinforcement shall be installed as shown on the truss design drawing or on supplemental truss member buckling reinforcement diagrams provided by the truss designer.

2. Permanent bracing shall be installed using standard industry bracing details that conform with generally accepted engineering practice. Individual truss member continuous lateral bracing location(s) shall be shown on the truss design drawing.

2303.4.1.6 Anchorage. All transfer of loads and anchorage of each truss to the supporting structure is the responsibility of the registered design professional.

2303.4.1.7 Alterations to trusses. Truss members and components shall not be cut, notched, drilled, spliced or otherwise altered in any way without written concurrence and approval of a registered design professional. Alterations resulting in the addition of loads to any member (e.g., HVAC equipment, water heater) shall not be permitted without verification that the truss is capable of supporting such additional loading.

2303.4.2 Metal-plate-connected trusses. In addition to Sections 2303.4.1 through 2303.4.1.7, the design, manufacture and quality assurance of metal-plate-connected wood trusses shall be in accordance with TPI 1. Manufactured trusses shall comply with Section 1704.6 as applicable.



Prepared with assistance from Missouri Truss Fabricators Association, a local chapter of SBCA.
View all SBCA *Tech Notes* at www.sbcindustry.com/technotes.php