I. INTRODUCTION & GENERAL COMMENTARY

Standard Responsibilities in the Design Process Involving Metal Plate Connected Wood Trusses has been developed in accordance with the consensus protocol of the American National Standards Institute (ANSI), through the Truss Plate Institute (TPI). It is based on WTCA 1-1995, Standard Responsibilities in the Design Process Involving Metal Plate Connected Wood Trusses, which was originally developed through an open consensus-based committee approach spearheaded by the Engineering Review Committee of the Wood Truss Council of America (WTCA), a not-for-profit corporation.

As of November 2004, WTCA 1-1995 has been incorporated into Chapter 2 of the ANSI/TPI 1-2002 consensus standard and as such is part of the IBC and IRC building codes where ANSI/TPI 1-2002 is referenced. Chapter 2 is intended to be a comprehensive and thorough approach to the clarification of design responsibilities when wood trusses are incorporated into a building or structure. Although some confusion may exist in the construction industry concerning the delegation of such design responsibilities, from the wood truss industry's perspective the design responsibilities of truss manufacturers and truss designers are quite clear. The person or organization involved in the truss design, the Truss Designer, is responsible for the individual truss component design. The company manufacturing the trusses, the Truss Manufacturer, in turn accepts responsibility for the performance of the trusses it manufactures. Through this process, all of which is carefully defined within Chapter 2, the Truss Manufacturer supplies an engineered product that will perform well if used in accordance with accepted engineering, and correct building practices.

Chapter 2 is not intended to restrict the work that a component manufacturer undertakes, but rather seeks to define specific scope of work considerations as one begins the contracting process for a given project. The intent of this document is to serve as a guide for possible language that can be included in contracts. Additionally, it is the intent of this document to point out when one party is asking another party to a contract to expand their typical scope of work. If any party expands their typical scope of work, strong consideration needs to be given to getting properly compensated for this expanded role in the project, as well as the expanded business risk.

II. SPECIFIC SECTION COMMENTARY

2.3.3 The term Building Designer, while it may include an Architect (see definition of Architect in 2.3.1) or an Engineer (see definition of Engineer in 2.3.9), is not restricted to Architects or Engineers, as many state and local laws do not require the involvement of a registered or licensed professional in the design of certain types of buildings or structures. In these instances, responsibility for compliance of the building or structure with all legal requirements rests with the Owner (see definition of Owner in 2.3.13).

2.3.20 The structural system of a building is the completed combination of structural elements that support the building’s self weight, applicable occupancy live loads, and environmental loads (e.g., snow, wind, seismic, etc.). These elements may include beams, columns, structural members, and prefabricated structural components, including metal plate connected wood trusses (see definition of Truss in 2.3.18). These elements, when combined, form the Building Structural System (see definition of Building Structural System in 2.3.4).

In designing the building and its structural system to comply with all legal requirements and to determine what structural elements may be used, drawings and specifications are prepared, which are referred to as the Structural Design Documents. The Structural Design Documents must provide sufficient information to enable the construction trades responsible for supplying the structural elements used to construct the building [such as the Truss Manufacturer (see definition in 2.3.21) if trusses are to be used] to design these structural elements.

2.3.19 The trusses designed for use in a building's structural system are individually depicted in the Truss Design Drawings. Truss Design Drawings are not typical construction shop drawings, as they do not set forth fabrication, assembly or installation details. Additional information on Truss Design Drawings can be found in WTCA's Truss Technology in Building (TTB) brochure How To Read A Truss Design Drawing.

2.3.22 The Truss Placement Diagram, if required, is prepared based on the Truss Manufacturer's interpretation of the Structural Design Documents and is meant to assist the Contractor (see definition of Contractor in 2.7) in correctly locating individual trusses in the structure. The Truss Placement Diagram will reflect a truss identifying...
mark and perhaps other products supplied by the Truss Manufacturer so these products can be more easily identified by the Contractor during field erection. The Truss Placement Diagram is not an engineered drawing and is not intended to replace the Structural Design Documents; it is only a guide for installation and requires no engineering input. Nevertheless, if the Truss Placement Diagram is required, it must be reviewed and approved by the Owner, either directly or by Contract with the Contractor and the Building Designer. Additional information on Truss Placement Diagrams can be found in WTCA’s TTB brochure How To Read A Truss Placement Diagram.

2.4 The model building codes used by all local jurisdictions stipulate that the Owner is responsible for obtaining a permit to build the structure and is responsible for that structure’s compliance with the building code requirements. The Owner may choose to retain others, such as the Contractor and Building Designer, and through Contract delegates the responsibility of design, construction and code compliance to these individuals. At times, the Contractor may also function as the Building Designer. The allocation of design responsibilities to the Contractor in such instances is consistent with the model building codes, which state that building permit applicants (e.g., the Contractor) are responsible for ensuring the structure remains in full compliance with the building code. At times the Owner may also function as the Contractor and quite possibly the Building Designer.

2.5.1 The listed adverse influences may have a long term effect on the performance of trusses and Structural Elements, such as moisture creates conditions conducive to softwood decay; high temperatures can cause decreased capacity of wood members; corrosive chemicals and gasses may affect zinc coated steel connector plates. For instance, an ocean exposure can cause connector plate corrosion. The Structural Design Documents must provide such conditions so that corrective measures may be incorporated into the Truss Submittals and Structural Element Submittals for the building.

2.5.2.1 & 2.5.2.2 The Structural Design Documents must provide for a spatial definition of all trusses to be located in the structure, although it is not necessary for the Structural Design Documents to provide the size of the truss chords and webs, web patterns, or the truss design. It is important that the full intent of the Structural Design Documents is understood and can be adequately transferred into the appropriate Truss Designs and Truss Design Drawings. Sometimes roof plans are developed, showing slopes, hips, overhangs, ridge and valley lines, etc. For anyone to produce a proper Truss Placement Diagram it is necessary for the Structural Design Documents to show span and spacing of trusses, locations of supporting columns, beams, girders, and/or load bearing walls. It is also necessary to show any raised or dropped ceiling areas and/or internal accessible attic spaces.

2.5.2.3 Identification of intended truss bearing locations within the Structural Design Documents is critical to enable each truss to be designed and built to the correct dimensions and for the intended support conditions. Specification of intended bearing conditions also enables the Truss Manufacturer to ensure that each truss is provided with adequate bearing. However, it is not the Truss Manufacturer’s responsibility to ensure that the structural elements upon which the trusses will rest (e.g., wall, beam, column, etc.) have sufficient capacity to support each truss, and provide sufficient bearing length.

2.5.2.4 To ensure that the structural capacity of the trusses designed by the Truss Designer is sufficient for the structure for which they are designed, all applicable design loads must be expressly stated in the Structural Design Documents. Simply referencing a section of a building code within the Structural Design Documents does not provide the Truss Manufacturer or others with the necessary or required information. Furthermore, special loading conditions for drifting snow or localized wind loading effects should be clearly indicated in the Structural Design Documents by text and/or diagram. Once the loadings are known, the Truss Manufacturer’s Truss Designer will undertake the structural design of every truss component needed to carry all the imposed loads and combinations of loads as specified by the code. These individual component designs can then be integrated into the final roof or floor system by the Building Designer.

2.5.2.5 Contemporaneous preparation of the Structural Design Documents with that of the Truss Design Drawings would allow for easier design of support and bearing conditions, temporary and permanent lateral and diagonal bracing, and all the anchorage needed to resist uplift, gravity and lateral forces on the structure. However, as it is often impractical, or even impossible, for the Truss Designer to provide input at the time the Structural Design Documents are prepared, many engineering assumptions will need to be made in the design of the structure. Accordingly, the Truss Design Drawings, when produced, may not exactly match with the assumptions used. For example, it is very unlikely that the calculated uplift loads will match the uplift loads developed by the Truss Designer. They should not be expected to be identical. For this reason, it is essential that the Truss Design Drawings be reviewed and approved by the Building Designer as delegated to by the Owner, or the Owner. It is the responsibility of the Owner or the Building Designer, as delegated, to specify appropriate uplift loads and connection requirements for use by the Contractor for all anchorage and connection requirements of the trusses.

2.5.2.6 Vertical deflection criteria for Structural Elements used in various types of construction applications are provided by all three major model building codes. These criteria are intended to minimize damage of supported construction materials (e.g., plaster, gypsum wallboard,
Truss-to-Truss connections, truss-to-truss

The Contractor or individual or organization of floor or roof systems is not the responsibility of the Truss trusses are to be placed. As the design and performance are part of a Building’s Structural System) in which the trusses produced, and not the floor or roof systems (which Manufacturer and Designer assume responsibility 2.5.3 shown on the Structural Design Documents. Truss-to-Truss connections, truss-to-truss girders, are all designed and specified by the truss Designers. All truss to non-truss connectors (e.g., truss to bearing walls, truss to steel beams, truss to masonry) are not the responsibility of the Truss Designer and must be shown on the Structural Design Documents.

2.5.2.8 Truss-to-Truss connections, truss-to-truss girders, are all designed and specified by the truss Designer. All truss to non-truss connectors (e.g., truss to bearing walls, truss to steel beams, truss to masonry) are not the responsibility of the Truss Designer and must be shown on the Structural Design Documents.

2.5.3 As trusses are simply Structural Elements, the Truss Manufacturer and Truss Designer assume responsibility only for the internal design integrity of the individual trusses produced, and not the floor or roof systems (which are part of a Building’s Structural System) in which the trusses are to be placed. As the design and performance of floor or roof systems is not the responsibility of the Truss Manufacturer and Designer, it is essential that the individual Truss Design Drawings be reviewed and approved by the Building Designer as delegated to by the Owner or the Owner. The goal is to ensure each individual component works appropriately within the systems and the structure, and also serves as a double check to ensure that the Truss Designer and Building Designer have not missed any details. In particular, (a) determining that the Truss Design Drawings and Truss Placement Diagram(s), if required, have been prepared in accordance with the requirements of the Construction Documents, (b) verifying the design criteria utilized in the Truss Design Drawings, (c) evaluating the effects of the truss designs on the floor or roof systems, and (d) determining that the truss configurations set forth in the Truss Design Drawings are consistent with the Construction Documents.

2.6.1 The Contractor or individual or organization responsible for the installation of the trusses and Structural Elements is entitled to rely on the accuracy of the design calculations contained in the Truss Design Drawings and the Truss Placement Diagram(s), if required, which set forth the Truss Manufacturer’s interpretation of the requirements of the trusses as set forth in the Structural Design Documents. It is recommended that the Contractor carefully review and approve the Truss Design Drawings and the Truss Placement Diagram to (a) determine if they comply with the intent of the Structural Design Documents, (b) check for any errors that may potentially lead to costly remedial work, and (c) plan for a systematic communication and coordination between the building trades with respect to truss placement and installation requirements, thereby greatly reducing the potential of having to cut and modify the trusses due to interference with plumbing, electrical, and/or HVAC runs and equipment. It is custom and practice in the construction industry for the prime or general Contractor to coordinate the approval and return of all Truss Submittals (i.e., Truss Design Drawings and Truss Placement Diagram(s) and Structural Element Submittals (e.g., I-joints, glulam beams, laminated veneer lumber, etc.) for the project.

2.6.2 & 2.6.5 Once the Truss Manufacturer delivers the trusses to the job site, he/she has turned over title of the trusses to whoever has purchased them. All work undertaken thereafter is the responsibility of the Owner of the trusses or the person or organization to whom the Owner delegates this responsibility.

Trusses are planar structural components whose structural performance depends upon being installed vertically, in-plane, at specific spacing, and being properly braced. Trusses can be easily damaged by improper field storage or handling during erection. Failure to adequately install and brace the trusses can also result in damage to the trusses, but more significantly, may also cause worker injury. The majority of wood truss related accidents occur during truss installation. The principal causes of such accidents include: (a) inadequate and/or improperly located temporary bracing, (b) improperly installed and/or
inadequate connection of the bracing to the truss, (c) improper and/or inadequate connection of the truss and/or bracing to the supporting structure, (d) overloading roof or floor trusses before the trusses have been permanently braced (e.g., stack of plywood), (e) overloading roof or floor trusses after installation is completed (e.g., stack of materials such as plywood, drywall, etc.), (f) improper or unauthorized field alterations, (g) installation of broken, damaged, or improperly repaired trusses, (h) improper truss alignment before bracing, (i) improperly designed or installed support structures (e.g., walls, beams, etc.), and (j) failure to provide during the installation process the required permanent compression member bracing at the locations shown on the Truss Design Drawings.

The wood truss industry provides recommendations on the handling, installation, and temporary bracing of trusses in the booklet BCSI 1-03 Building Component Safety Information: The Guide to Good Practice for Handling, Installing & Bracing of Metal Plate Connected Wood Trusses. This eleven part information series contains sections on handling, installing and temporary bracing; web member permanent bracing and reinforcement; construction loading; truss damage, jobsite modifications and installation errors; gable end frame bracing; bracing of parallel chord trusses; toe-nailing for uplift reactions; multi-ply girders; post frame truss installation and bracing; and fall protection.

WTCA also has a Temporary Bracing Model showing the stiffening effect of proper temporary bracing on a structure. These materials are available through local Truss Manufacturers or WTCA. The recommendations provided in these documents are offered as guidelines and are not to be interpreted as superior to the Building Designer’s specifications or considered to be the only method for handling, installing, and bracing of trusses.

2.6.3 & 2.6.4 As trusses are engineered structural components, their structural integrity can be substantially altered by damaging, cutting, or modifying any of their members. Truss members may break if improperly handled during the unloading, storage, installation and erection phases of the project. If the trusses are cut or modified by the construction trades to avoid interference with other building components, the Contractor is responsible for securing the documentation required for repairing the truss. The Truss Manufacturer should be informed immediately of any damaged, cut, or field modified trusses and may be able to assist in providing the required documentation.

BCSI-B5 Truss Damage, Jobsite Modifications and Installation Errors, describes how truss damage, alterations and installation errors must be repaired according to an approved truss repair detail and the information that the field crew must provide in order to secure an accurate repair detail from the Truss Manufacturer.

2.6.6 Properly designed permanent bracing is necessary to maintain the integrity of the structure, especially when the structure is subjected to lateral loads imposed by wind or seismic forces. The design of all permanent bracing for the structure, including the trusses, is the responsibility of the Building Designer and not the responsibility of the Truss Manufacturer and Truss Designer, as the loads resisted by permanent bracing must be transferred to, and supported by the structure.

Included as part of the permanent bracing for trusses is the continuous lateral bracing required to enhance the buckling capacity of certain truss compression members. The need for permanent lateral bracing or support for certain individual truss members (chords or webs) is determined by the Truss Designer, and is specified in detail on the individual Truss Design Drawings. This bracing is intended to prevent bowing or buckling of individual truss members under design loads and enables the truss component to perform as designed.

However, the Truss Designer must rely upon others to specify how the lateral bracing is to be anchored or restrained to prevent multiple identical members from buckling out of the plane of the trusses, at the same time. Permanent diagonal bracing at intervals in the plane of the braced member is one way to accomplish this restraint.

The Truss Designer will set forth in the Truss Design Drawings, the maximum axial compression forces in the truss members, as well as the location(s) where this bracing is required. The Building Designer will then design the size, connection and anchorage of the permanent bracing to the truss member, as well as to the supporting structure.

Additional information on the design and installation of permanent bracing, written with the Building Designer in mind, is reviewed in detail in the following WTCA publications: Commentary for Permanent Bracing of Metal Plate Connected Wood Trusses and BCSI-B3 Web Member Permanent Bracing/Web Reinforcement.

2.7 The Truss Manufacturer typically receives the Structural Design Documents directly from the Contractor. From the information contained in the Structural Design Documents, the Truss Manufacturer finds and documents the truss design criteria and, if required, creates a Truss Placement Diagram. The truss design criteria as documented by the Truss Manufacturer are provided to the Truss Designer, who then uses this information to prepare the Truss Design Drawings. Some Truss Manufacturers directly employ Truss Designers; for others, the Truss Designers are retained on a contractual basis.

The Structural Design Documents contain appropriate information to enable the Owner, and/or Building Designer or Contractor to adequately review and verify that the Truss Design Drawings conform to the requirements and intent of the Structural Design Documents. Sufficient information is
also provided to enable the design of the size, connections, and anchorage of the permanent continuous lateral bracing (see 2.6.6). The Truss Design Drawings furthermore provide all the truss related information typically required by code officials for plan review and field inspection purposes.

2.7.6 Chapter 3 of ANSI/TPI 1-2002 is the quality standard for the manufacturing processes of metal plate connected wood trusses.

2.7.7 The Truss Placement Diagram prepared by the Truss Manufacturer is not an engineering document and should never be considered as a replacement for a structural framing plan prepared by the Building Designer. The preparation of the Truss Placement Diagram does not require the special education, training and experience that define the practice of engineering (as found in state engineering laws).

Since the Truss Placement Diagram prepared by the Truss Manufacturer is not an engineering document, it should not be sealed. When a sealed structural framing plan is required, it should be prepared by the Building Designer responsible for the overall building design to ensure the adequacy and safety of the entire structure. The Truss Placement Diagram prepared by the Truss Manufacturer should ordinarily be reviewed and accepted for conformance with the overall building design by the Building Designer of record.

Additional information on Truss Placement Diagrams can be found in the TTB brochure How To Read A Truss Placement Diagram.

2.7.8 Section 6.4.11 of ANSI/TPI 1-2002 defines the quality control factor ($C_q$).

2.8.1 & 2.8.2 Truss Designers do not review, or check for errors or omissions potentially contained within, the Structural Design Documents. The Truss Designer’s scope of work is to simply design trusses that have adequate capacity for the design conditions shown on the Truss Design Drawings, so long as the truss is spaced as referenced on the drawing (usually 24” on center) and the truss is properly manufactured, installed and braced. The physical size and shapes of the trusses and the design loadings should be shown on the Structural Design Documents. The Truss Design Drawings then become a reflection of the intent of the Structural Design Documents, but it is essential that the individual Truss Design Drawings be reviewed and approved by the Building Designer as delegated to by the Owner or by the Owner themselves, before the trusses are manufactured.

In the absence of a professional Building Designer, or an understanding by the Owner of how loads are applied or how they flow through the structure to the foundation, the Truss Designer does not assume these responsibilities. Truss Designers also have no responsibility to evaluate the effect of the trusses on the structural system of the building. The Truss Design Drawings furthermore do not constitute a temporary or permanent bracing plan for the structure.

2.8.3 BCSI-B5 Truss Damage, Jobsite Modifications and Installation Errors, describes how truss damage, alterations and installation errors must be repaired according to an approved truss repair detail. This detail shall conform to sound wood design practices and can be undertaken by any design professional familiar with wood design. See www.woodtruss.com to review this brochure.

A sample truss specification for Architects and Engineers (SECTION 061753 METAL PLATE CONNECTED WOOD TRUSSES) will aid in defining specific project scopes of work.