



Research Report

Position Statement on Sealed Truss Placement Diagrams for the 2012 or 2015 International Residential Code

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Structural Building Components Association (SBCA)

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This research report is based on practical scientific research (literature review, testing, analysis, etc.), with the goal of supporting strategic needs for code and standards development and market expansion. This research report complies with the following sections of the building code:

- [IBC Section 104.11.1](#) and [Section 1703.4.2](#) – "**Research reports.** Supporting data, where necessary to assist in the approval of materials or assemblies not specifically provided for in this code, shall consist of valid research reports from *approved sources*."
- [IBC Section 202](#) – "**APPROVED SOURCE.** An independent person, firm or corporation, *approved* by the *building official*, who is competent and experienced in the application of engineering principles to materials, methods or systems analyses."

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Introduction:

It can be often misunderstood whether a Truss Design Engineer has the responsibility to seal a Truss Placement Diagram (TPD). The purpose of this research report is to provide the relevant code sections from the latest editions of the International Residential Code (*IRC*) for thorough analysis and interpretation. To be clear, the TPD is not to be viewed as an engineering document except as stated below in our analysis. Rather, it is provided to assist the installer in properly locating the trusses within the structure. All the necessary truss engineering and analysis is found on the Truss Design Drawings (TDD).

If a TPD is provided, it is recommended that the Building Designer review and approve the TPD to ensure that the intended load paths have not been altered. If a Truss Design Engineer were to seal a TPD, it has been suggested that they could inappropriately be held responsible for ensuring the proper flow of loads through the truss to the bearing and support structure below the truss and into the foundation. A Truss Design Engineer would only undertake Building Designer responsibilities under a special set of circumstances, including that he/she is professionally capable of taking on such responsibility and that he/she are properly compensated for the work.

The Truss Design Engineer is not the Building Designer and cannot be construed as such since this is completely outside of their defined scope of work. Professional engineering laws and regulations are clear with respect to declaring the specific scope of work being performed by each engineer on a project. A Truss Design Engineer could only undertake Building Designer responsibilities under a special set of circumstances and when they are delegated the appropriate scope of work as a Successor Engineer. This would require authorization from the owner of the project and a contract to do so, along with being professionally capable of taking on such responsibility and being compensated for doing so.

Key Definitions:

Definitions related to trusses – not specifically defined in the *IRC* but defined in *ANSI/TPI 1 (TPI 1)* by code reference to *TPI 1*:

TRUSS PLACEMENT DIAGRAM (TPD) – The illustration supplied by the Truss Manufacturer identifying the location assumed for each Truss, and which references each individually designated Truss Design Drawing.

Definitions Included in the International Residential Code:

CONSTRUCTION DOCUMENTS – Written, graphic and pictorial documents prepared or assembled for describing the design, location and physical characteristics of the elements of a project necessary for obtaining a building permit. Construction drawings shall be drawn to an appropriate scale (see [2012 IRC Section R202](#) or [2015 IRC Section R202](#)).

REGISTERED DESIGN PROFESSIONAL (RDP) – An individual who is registered or licensed to practice their respective design profession (architect or engineer) as defined by the statutory requirements of the professional registration laws of the state or jurisdiction in which the project is to be constructed.

TRUSS DESIGN DRAWING (TDD) – The graphic depiction of an individual truss, which describes the design and physical characteristics of the truss. The TDD shall be prepared by a registered professional where required by the statutes of the jurisdiction in which the project is to be constructed in accordance with [2012 IRC Section R106.1](#) or [2015 IRC Section R106.1](#) (see [2012 IRC Section R502.11.4](#) and [Section R802.10.1](#) or [2015 IRC Section R502.11.4](#) and [Section R802.10.1](#)).

Definitions included in the International Residential Code Referenced Standard *TPI 1*:

BUILDING DESIGNER – The Owner of the Building or the individual or organization that contracts with the Owner for the design of the Building Structural System and/or who produces the Construction Documents.² When mandated by the Legal Requirements, the Building Designer shall be a RDP.

TRUSS DESIGNER – Person responsible for the preparation of the Truss Design Drawings.³

¹ ANSI/TPI 1 is referenced for the design and manufacture of metal plate connected wood trusses per 2012 IRC/2015 IRC Section [R502.11.1/R802.10.1/Chapter 44](#). Per the *IRC* 2012 Commentary: *The code contains no prescriptive provisions for the design and installation of wood trusses. A design that conforms to accepted engineering practice is required.*

Recognizing the extensive use of trusses in residential construction, the code references ANSI/TPI 1, National Design Standard for Metal-plate-connected Wood Truss Construction.

² Adapted from *IBC Section 107.1*

³ Adapted from *IBC Section 2303.4.1.4*

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Other Pertinent Definitions:

DELEGATED ENGINEER⁴ – An engineer who undertakes a specialty service and provides services or creative work (delegated engineering document) regarding a portion of the engineering project. The delegated engineer is the engineer of record for that portion of the engineering project.

SPECIALTY ENGINEER⁵ – An engineer, who is not the structural engineer of record, who provides engineering criteria or designs necessary for the structure to be completed. The specialty engineer may be a delegated engineer.

SUCCESSOR ENGINEER⁶ – An engineer seeking to reuse already sealed contract documents under the successor professional engineer's seal must be able to document and produce upon request evidence that he has in fact recreated all the work done by the original professional engineer. The successor professional engineer must take all professional and legal responsibility for the documents which he sealed and signed and can in no way exempt himself from such full responsibility. Plans need not be redrawn by the successor professional engineer; however, justification for such action must be available through well-kept and complete documentation on the part of the successor professional engineer as to his having rethought and reworked the entire design process.

TRUSS SYSTEM ENGINEER⁷ – An engineer who designs a Truss System.

Background:

The majority of residential structures in the United States are built using the prescriptive code of the *IRC*. Trusses are simply replacements for the prescriptively applied joists and rafters, and are highly engineered structural elements.

Certain jurisdictions are requesting engineering seals on TPDs (also known as a truss placement plan, truss layout, framing plan or framing layout) for residential structures. The following information should be used to provide insight into why component manufacturers should seriously consider all the ramifications of providing seals on TPD for projects governed by the [2012 IRC](#) or [2015 IRC](#).

While the *IRC* remains relatively silent on the issue, since the 2006 edition, the *IBC* has provided specific language regarding TPD:

2006 IBC 2303.4.3 Truss Placement Diagram. A diagram supplied by the truss manufacturer 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 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.

In the 2009 *IBC*, the truss section was reorganized ([S66-06/07](#)). The requirement regarding TPD was revised as well ([S217-07/08](#)) as proposed by the National Council of Structural Engineers Associations (NCSEA). This revised language accepted for the [2009 IBC Section 2303.4.2](#) is also included in the [2012 IBC Section 2303.4.2](#) and the [2015 IBC Section 2303.4.2](#).

2009/2012/2015 IBC 2303.4.2 Truss placement diagram. The truss manufacturer shall provide a truss placement diagram that identifies 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 that serve only as a guide for installation and do not deviate from the permit submittal drawings shall not be required to bear the seal or signature of the truss designer.

The exception was removed from the 2006 *IBC* to further clarify that a TPD is not an engineered document and therefore does not require an engineer's seal. The rationale for the change proposed by [S217-07/08](#) is as follows:

The truss placement diagram is an erection diagram that replicates the information on the approved construction documents per Section 106.3. As it requires no engineering input, direct supervision and the signature and seal of a registered design professional is not required.

The Commentary to the [2012 IBC Section 2303.4.2](#) provides further background on the intent of the code change.

⁴ Definition from Florida Administrative Code Rule [61G15-30.002](#) Definitions: Delegated Engineer

⁵ Definition from Florida Administrative Code Rule [61G15-31.002](#) Definitions: Specialty Engineer

⁶ Definition from Florida Administrative Code Rule [61G15-31.001](#) Procedures for a Successor Professional Engineer Adopting As His Own the Work of Another Engineer

⁷ Definition from Florida Administrative Code Rule [61G15-31.003](#) Design of Structures Utilizing Prefabricated Wood Trusses: Truss System Engineer

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This section describes and defines the term "truss placement diagram." It is intended to minimize the confusion that exists in the construction industry between a variety of terms that are often used interchangeably, such as "installation documents," "construction documents," "shop drawings," etc. The term "truss placement diagram" is preferred by the truss industry and is very specific. The section requires a truss placement diagram to identify the location of each truss and references the corresponding truss design drawing to facilitate inspection and proper installation.

Analysis:

2012 and 2015 IRC

The *IRC* does not reference the TPD but does specifically state what information needs to be on a TDD ([2012 IRC Section R502.11.4](#) and [Section R802.10.1](#) or [2015 IRC Section R502.11.4](#) and [Section R802.10.1](#)) and that the TDD needs to be prepared by a Truss Design Engineer ([2012 IRC Section R502.11.1](#) and [Section R802.10.2](#) or [2015 IRC Section R502.11.1](#) and [Section R802.10.2](#)).

R502.11 (R802.10) Wood trusses.

R502.11.1 (R802.10.2) Design. Wood trusses shall be designed in accordance with approved engineering practice. The design and manufacture of metal plate connected wood trusses shall comply with ANSI/TPI 1. The truss design drawings shall be prepared by a registered professional where required by the statutes of the jurisdiction in which the project is to be constructed in accordance with Section R106.1.

R502.11.4 (R802.10.1) Truss design drawings. Truss design drawings, prepared in compliance with Section R502.11.1 (R802.10.1), shall be submitted to the building official and approved prior to installation. Truss design drawings shall 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 all joints.
3. Required bearing widths.
4. Design loads as applicable:
 - 4.1. Top chord live load;
 - 4.2. Top chord dead load;
 - 4.3. Bottom chord live load;
 - 4.4. Bottom chord dead load;
 - 4.5. Concentrated loads and their points of application; and
 - 4.6. Controlling wind and earthquake loads.
5. Adjustments to lumber and joint connector design values for conditions of use.
6. Each reaction force and direction.
7. Joint connector type and description, e.g., size, thickness or gauge, and the dimensioned location of each joint connector except where symmetrically located relative to the joint interface.
8. Lumber size, species and grade for each member.
9. Connection requirements for:
 - 9.1. Truss-to-girder-truss;
 - 9.2. Truss ply-to-ply; and
 - 9.3. Field splices.
10. Calculated deflection ratio and/or maximum description for live and total load.
11. 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.

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12. Required permanent truss member bracing location.

On the contrary, the [2012 IBC Section 2303.4](#) and the [2015 IBC Section 2303.4](#) does include the following relevant sections that lay out the differences between TDDs and TPDs:

2303.4.1.4.1 Truss design drawings. Where required by the registered design professional, the building official or the statutes of the jurisdiction in which the project is to be constructed, each individual truss design drawing shall bear the seal and signature of the truss designer.

Exceptions:

1. Where a cover sheet and truss index sheet are combined into a single sheet and attached to the set of truss design drawings, the single cover/truss index sheet is the only document required to be signed and sealed by the truss designer.
2. When a cover sheet and a truss index sheet are separately provided and attached to the set of truss design drawings, the cover sheet and the truss index sheet are the only documents required to be signed and sealed by the truss designer.

2303.4.2 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 that serve only as a guide for installation and do not deviate from the *permit* submittal drawings shall not be required to bear the seal or signature of the truss designer.

2303.4.3 Truss submittal package. The truss submittal package provided by the truss manufacturer shall consist of each individual truss design drawing, the truss placement diagram, the permanent individual truss member restraint/bracing method and details and any other structural details germane to the trusses; and, as applicable, the cover/truss index sheet.

The [2012 IRC Section R106.1](#) and the [2015 IRC Section R106.1](#) provides that the plans and specifications for a project shall be prepared by a licensed architect or engineer where required by the law of the jurisdiction in which the project is being constructed. In particular, both state:

R106.1 Submittal documents. Submittal documents consisting of construction documents, and other data shall be submitted in two 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.

Exception: The building official is authorized to waive the submission of construction documents and other data not required to be prepared by a registered design professional if it is found that the nature of the work applied for is such that reviewing of construction documents is not necessary to obtain compliance with this code.

The plans and specifications should in turn clearly define the scope of the work proposed by the Building Designer:

R106.1.1 Information on construction documents. Construction documents shall be 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 determined by the building official. Where required by the building official, all braced wall lines, shall be identified on the construction documents and all pertinent information including, but not limited to, bracing methods, location and length of braced wall panels, foundation requirements of braced wall panels at top and bottom shall be provided.

Statutes for Professional Engineering

A state's professional engineering law(s) and the *IBC* provide the basis upon which to evaluate the need to provide an engineer's seal on a TPD.

Requiring the TPD to be sealed, where it is not prepared by an engineer or under his/her immediate personal supervision, is contrary to most state engineering laws⁸ which typically include language regarding sealing construction documents:

Each registered professional engineer shall, upon registration, obtain a seal of the design authorized by the State Board of Examiners for Engineering and Land Surveying. Every final document including drawings, specifications, designs, reports, narratives, maps and plans issued by a registrant shall be stamped with the seal and signed by the registrant. The signature and

⁸ Consult with state engineering statutes for your jurisdiction.

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stamp of a registrant constitute a certification that the document was prepared by the registrant or under the supervision and control of the registrant⁹.

Given that TPDs, in general, are created by the Truss Manufacturer as a guide for installation of the trusses and are not created by a Truss Design Engineer, a TPD cannot be required to have a Truss Design Engineer's seal on it for any building project in jurisdictions where this would violate professional engineering law.

ANSI/TPI 1¹⁰

In preparing the construction documents, the Building Designer needs to provide the Truss Design Engineer with the information necessary to properly design the trusses for the building according to *TPI 1-2007*, which is referenced by the 2012 *IRC* and *TPI 1-2014*, which is referenced by the 2015 *IRC*.

TPI 1-2014 includes the following regarding the use of a TPD in Chapter 2 (*TPI 1-2007* includes similar information in Section 2.3 and Section 2.4):

2.3 RESPONSIBILITIES

2.3.5.4 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 Design Engineer).

2.3.6.4 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, it does not require the seal of any Registered Design Professional including in cases where the legal requirements mandate a Registered Design Professional for buildings.

2.3.6.5 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...

Truss Design and Preparation of Truss Design Drawings

Assuming the requisite information is provided within the construction documents issued by the RDP or Building Designer, the Truss Design Engineer's sole responsibility is to properly design the individual trusses according to this information. Once designed, a truss is then depicted on a TDD. The Truss Design Engineer is therefore specifically responsible for the single truss design depicted on each TDD.

Who Typically Prepares Truss Placement Diagrams?

Assuming the requisite information is provided in the construction documents, TPDs are prepared by component manufacturer personnel who are typically not professional engineers. The individuals preparing a TPD are trained individuals who work as truss technicians, truss take-off specialists or truss salespeople. As TPDs are typically prepared outside the Truss Design Engineer's scope of work, they may not be reviewed or even seen by the Truss Design Engineer. TPD are generally not prepared within the typical duties of the Truss Design Engineer and are therefore not prepared under the Truss Design Engineer's direct supervision.

To Require Truss Placement Diagrams to be Sealed Would Violate most State Engineering Law.

Because TPD are generally neither created by nor created under the immediate personal supervision of a licensed design professional, they cannot be sealed. Requesting a Truss Design Engineer to seal a non-registered person's work is illegal in most state engineering laws which typically state something like the following:

Upon issuance of a license, each license holder is required to obtain a seal and submit an impression of the seal or an electronic seal, and an original or an electronic signature to the board for board records... The purpose of the engineer's seal is to assure the user of the engineering product that the work has been performed or directly supervised by the professional engineer named and to delineate the scope of the engineer's work. License holders shall only seal work done by them, performed under their direct supervision... Upon sealing, engineers take full professional responsibility for that work.¹¹

⁹ Example language from the State of Oregon - www.oregonlegislature.gov/bills_laws/lawsstatutes/2013ors672.html

¹⁰ <http://www.tpinst.org/>

¹¹ [Texas Board of Professional Engineers Laws and Rules](#): §137.31 Seal Specifications and §137.33 Sealing Procedures.

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Why are Truss Placement Diagrams Prepared?

TPDs are intended to assist customers, erectors and code enforcement officials in positioning or locating the trusses and related structural components supplied by the component manufacturer.

Their function is to serve as detailed installation instructions. They indicate the component manufacturer's assumed location for each truss or related component that has been designed and manufactured.

For example, a truss or related structural building component is no different than a window that is manufactured and in turn installed within a building. A window may be a highly engineered component of a house with specific installation specifications and instructions. However, there is no requirement to provide an engineer's seal on the installation instructions for windows.

A Truss Placement Diagram would be best described as a "shop drawing". "Shop drawings," as defined by the Federal Acquisition Regulation (FAR)¹², are typically drawings submitted by the construction contractor or a subcontractor at the different phases or stages of construction or required under a construction contract, showing in detail either or both of the following:

- (1) The proposed fabrication and assembly of structural elements.
- (2) The installation (i.e., form, fit, and attachment details) of materials or equipment.

FAR is the primary regulation for use by all Federal Executive Agencies in their acquisition of supplies and services with appropriate funds.

Similar to a shop drawing, a TPD is intended as an installation detail. Most state engineering laws typically include specific language regarding what defines the "Practice of Engineering":

"practice of engineering" means the performance of or an offer or attempt to perform any public or private service or creative work, the adequate performance of which requires engineering education, training, and experience in applying special knowledge or judgment of the mathematical, physical, or engineering sciences to that service or creative work.¹³

The preparation of a TPD does not require the need for education in mathematical, physical, or engineering sciences.

Findings:

The 2012 *IRC* and 2015 *IRC* do not address the TPD but the code referenced standard *ANSI/TPI 1* does specifically state that the TPD does not require the Truss Design Engineer's seal when it serves only as a guide for truss installation. Per [2012 IRC Section R102.4](#) and [2015 IRC Section R102.4](#), the standards referenced in this code shall be considered part of the requirements of this code to the prescribed extent of each such reference.

Additionally, the [2012 IBC Section 2303.4.2](#) and [2015 IBC Section 2303.4.2](#) both specify that a TPD does not require the seal of the Truss Design Engineer when the TPD serves as a guide for installers. It is the responsibility of the Building Designer to review the TPD, if provided, and verify that it does not deviate from the permit submittal documents.

Conclusion:

Truss Design Engineers should not be asked by RDPs, Building Designers or Building Code Officials to seal TPDs.

References and Substantiating Data:

ANSI/TPI 1, National Design Standard for Metal Plate Connected Wood Truss Construction, Truss Plate Institute, 2007, 2014

International Residential Code / International Building Code, International Code Council, 2006, 2009, 2012, 2015

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¹² <https://www.gpo.gov>

¹³ Texas Board of Professional Engineers Laws and Rules: §1001.003 Practice of Engineering. <https://engineers.texas.gov/downloads/lawrules.pdf>